73 Amateur Radio

March 1964
Same Old 40c

GENEVA IN 1965?

Frequency re-allocations are coming sooner than we thought possible. We are not prepared.

FCC DOCKET DUE IN MARCH

The FCC's answer to ARRL's RM-499 should be out this month. Keep your fingers crossed.

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Hybrid and Repeat Coils	150 to 600	150 to 600	20 ∿ to 40 KC	+ 15 dbm to + 18 dbm
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High Level Matching	50 to 600	1.2 to 600	10 ∿ to 40 KC	20 W to 40 W
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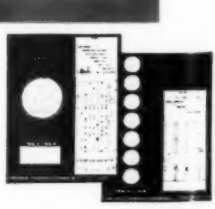

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73

Magazine

Wayne Green W2NSD I
Editor, etcetera

March, 1964

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What is the ARRL?

Who is the ARRL?

What does the ARRL do?

What should it do?

There are still a few fellows who have either skimmed over my editorials or just not read them at all, that feel that I have been attacking the ARRL and perhaps want to put them out of business. I do wish these nit wits would take a little time off from flapping their mouth to run their eyeballs over my editorials and make themselves aware of the adulterated hogwash they are putting out.

Now, to the ARRL. Have you ever given much thought to what the ARRL actually is? Let's take a look at it.

The primary activity of the ARRL is to publish QST, the Handbook and other assorted publications. As a publishing house it is quite successful. The League also provides a wide range of services to the amateurs such as managing the QSL Bureau, issuing cartificates, maintaining the Honor Roll, BPL, distributing films to clubs, running W1AW, sending out messages through the Official Broadcast Stations, etc.

The League employs a counsel to aid it in submitting proposals to the FCC and to provide legal references for lawyers representing amateurs who are having difficulties tied in with amateur radio.

The League is supposed to be run by the Board of Directors. Unfortunately the Board gets together only once a year and each Director is only in office for two years unless he is re-elected. This means that each Director can look forward with confidence to but two meetings. This is an extremely weak point in the makeup of the League and may be largely responsible for the lack of representation felt by many members.

de

W2NSD/1

never say die

The directors decide upon the president and vice president. Unfortunately this process has been carried out at secret pre-board meetings by the Directors and the real facts entering into the selection of these officers have been kept hidden. Since the president can be dismissed by the directors without appeal to the members he has little power and historically has been merely a figurehead.

Who then actually runs the League? Let's look further. Let's take a look back into history.

The ARRL was set up by Hiram Percy Maxim. Maxim was a genius, by the way, and he set up the League very cleverly. The elections of the directors gave the members the feeling of participation and permitted the drawing of broad parallels with the U. S. government setup and looked at first glance like a democracy. But Maxim kept a tight hand on the reins and never let his "democracy" get out of control. We call this a dictatorship today. Many dictatorships work out very well as long as the dictator is benevolent. The problem always comes up: when the dictator dies, where do we find another benevolent dictator. The normal system is for the power to fall into the hands of an underling who has worked himself up with just that power in mind.

K. B. Warner replaced Mr. Maxim. I wasn't in a position to know what was going on on the inside in those days, but I do note grumbles and complaints still with us from those years in letters from old timers who were in a position to know.

Budlong was in the driver's seat when I began to become aware of the world of amateur radio politics. Discontent reached an all-time high under Budlong and the League's stature reached the low point which brought on Docket 9295, the FCC proposal which virtually ended the League's representation of the amateur before the FCC. Budlong was the Editor of QST and the Secretary of the League.

The system for getting favorable directors

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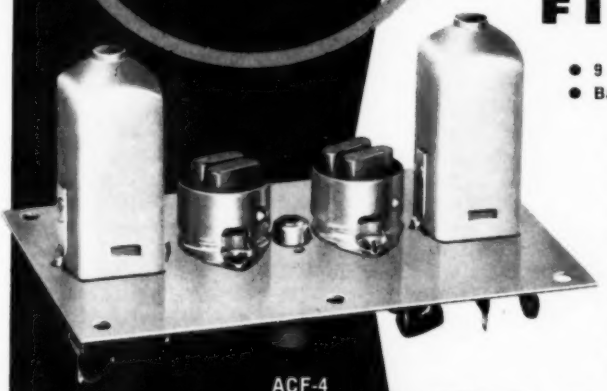

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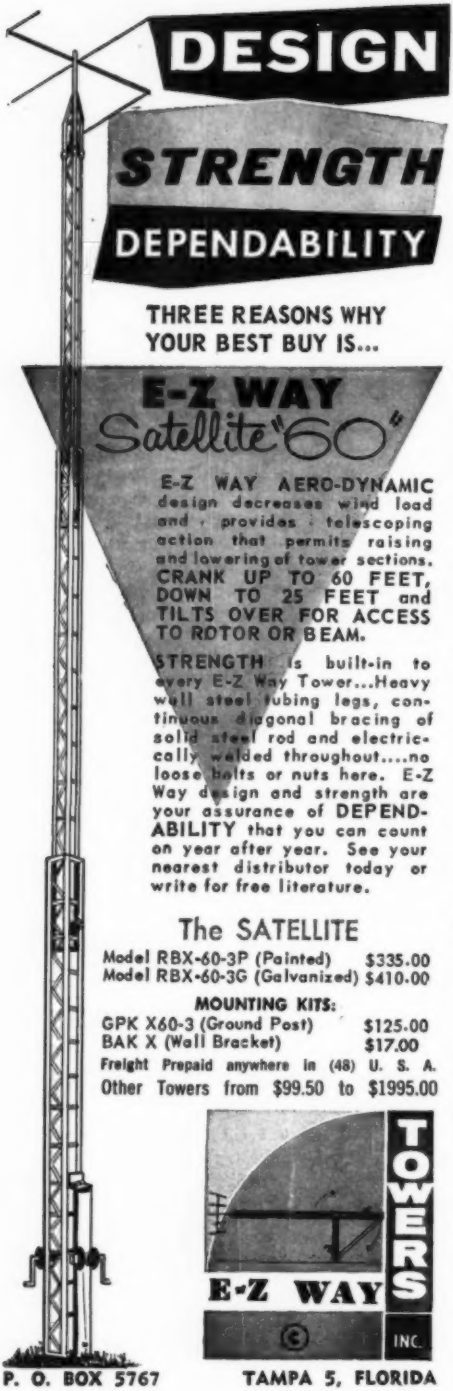
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re-elected seemed to be worked out to about perfection and though I believed that amateur radio would be the winner if Bud were replaced, it took a while before the opportunity came along to help. Eventually it did and in a short while Bud's retirement was announced.

The vacuum created brought on an interesting power play among some of the directors. This was largely responsible for the unsettling events of the last year which culminated with the secret submission of RM-499 to the FCC. This, as our poll and the response to the FCC has shown, has been immensely unpopular and the tidalwave of resentment which has resulted seems about to bring on another shuffle. Rumors from responsible sources tell us that Hoover, having learned what he has gotten himself into, will shortly tender his resignation. There is some question in my mind about how much influence commercial intersts may be able to exert to prevent this from happening.

Which brings us down to today. When amateurs write in and tell me that everything is going to be OK, that the ARRL has been leading us for fifty years and we should all put our support behind the League, I wonder what they think the League is? Who are they supporting? What policies? Whose policies?

Who is in charge today? Hoover? Huntoon? Handy? Houghton?

I don't think so.

When Mort Kahn W2KR (K4KR) was elected as a director I expected him to end up as Secretary of the League in short order. He no doubt could have, but instead he organized the directors and masterminded everything through his position on the Executive Committee. This left the burden of the administrative details in Huntoon's hands and the reins in Kahn's. Mort was, I believe, largely responsible for the decision to move to a new headquarters, to build a new headquarters building, and to get the members to donate to the building fund. He also seems to be deeply involved with the incentive licensing hassle and the RM-499 petition.

If Mort follows through on his reported decision to not seek re-election as Hudson Director this will throw the ball back up in the air again. Mort seems to be pretty happy now that he has moved, yacht and all, down to Florida so it is possible that he will wave goodbye to the tumult and responsibility of amateur politics.

Perhaps you think I'm all wet. You can find out about much of this if you contact any

(Turn to page 78)

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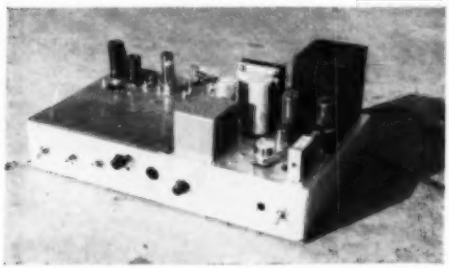
The Little Punch on VHF

Jim Kyle K5JKX
Jim Speck W5PPE

The requirement—a good rig for VHF use, with minimum cash outlay for a top-notch signal.

The result—a little puncher with measured 84-percent efficiency (!), incorporating rf sections, modulator, and power supply all on a 10x17x3 chassis. Though the signal rivals that of much larger rigs, it takes only 25 watts of dc input to the final. It incorporates audio clipping and filtering, with up to 30 db of clipping available when conditions warrant. It also includes all control circuitry for the complete station. Interested? Read on.

First let's talk about that 84-percent figure. We don't really believe it either, but the calibrated instruments we checked it out with showed 25 watts in, 26 watts forward power, and 5 watts reflected. This means a net power output of 21 watts for 25 in, or 84 percent efficiency. Actually, we think that the calibration tolerances sort of all added up together to give this figure, and the true efficiency is probably somewhere about 75 percent—but this is still a whale of a lot higher than the 55-60 percent usually considered acceptable at 144 mc and above.



Complete transmitter, fully assembled. Vacant space on rf module will be occupied by 432 mc tripler, to be added soon. Details on it after it's in use.

The whole thing started one warm night when co-author W5PPE asked K5JKX, "Why aren't you on two?"

Answered the other Jim, "No rig."

"How's your junk box?" asked Speck.

"Let's go look," said Kyle, and that was the beginning.

A comprehensive search of the garage (one huge junkbox) yielded a 250 volt plate transformer of unknown vintage, a 10x17x3 chassis somewhat resembling a chunk of swiss cheese, a 20 watt modulation transformer salvaged from Collins surplus, a 6 amp 6 volt filament transformer, a couple of 800PIV silicon diodes, and miscellaneous small items, including a large sheet of perforated brass.

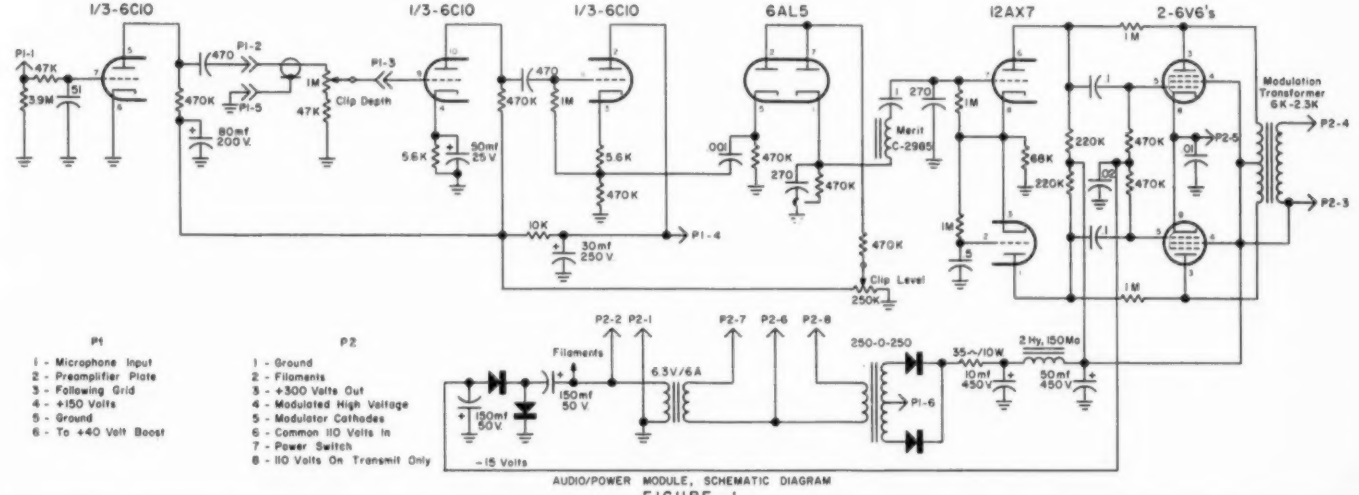
The search then moved to the W5PPE QTH, where most of the remaining parts (including the 6360) were located.

Upon looking at the mutilated chassis, the thought struck. Why not make it a "modular" rig, so that everything could be built on plates separate from the chassis and plugged in. This was done, and has worked out nicely.

At the starting point, the rig was divided into three major modules: rf deck, modulator/power supply, and control circuits. The control circuits were built into the chassis. The rf deck was built on the sheet brass, and the audio/power module was assembled on a sheet of structural-grade aluminum which came to light along the way.

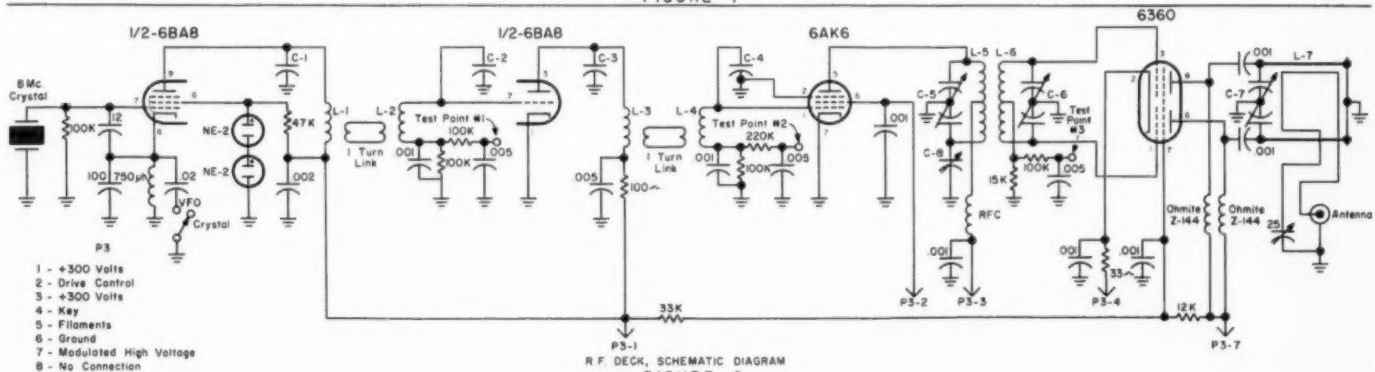
Notes on Figs. 1 and 2

L1C1, L2C2—resonate at 24 mc coil forms Miller 4300 red core
L3C3, L4C4—resonate at 72 mc coils on Miller 4300 white core
L5—3 turns Airdux 608
L6—2 turns Airdux 608
C5, C6—15 pf min. butterfly
L7—Line, 6" long 1" wide #12 wire
C7—dual 8 pf Bud variable
C8—½-4 pf piston trimmer



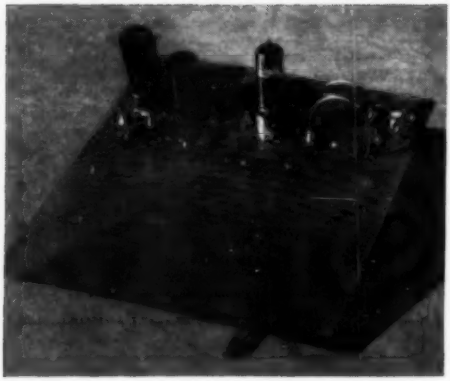
AUDIO/POWER MODULE, SCHEMATIC DIAGRAM

FIGURE 1



R.F. DECK, SCHEMATIC DIAGRAM

FIGURE 2



Top view of rf module showing details of high-efficiency plate line and fanning wire.

Original plan was for Speck to build the rf, Kyle the audio/power, and both to work on the control portion. The design was carried out on this plan, but somehow it all ended up getting built by Speck! In return, the work of writing it up fell to Kyle—so send your complaints to him.

First came the audio/power portion; the schematic for this appears in Fig. 1. It's largely conventional, but has a few unusual points here and there. One is the use of a 6C10 Compactron triple-triode as the preamplifier. At first, all three triodes were used as amplifiers, but distortion was extreme. Changing the third section to a cathode-follower so that the clipper would be driven from a low-impedance source cured this problem.

Originally, also, the 6C10 plate supply came from the 250 volt power supply in the same module, through a hefty dropping resistor/bleeder combination. However, with this hookup the audio took 5 seconds to come on at the start of each transmission; apparently the decoupling-filter time constant was way too long. Rather than change resistors, the lead to pin 4 of plug No. 1 was added, to steal power for the preamplifier from the receiver power supply located in the control section.

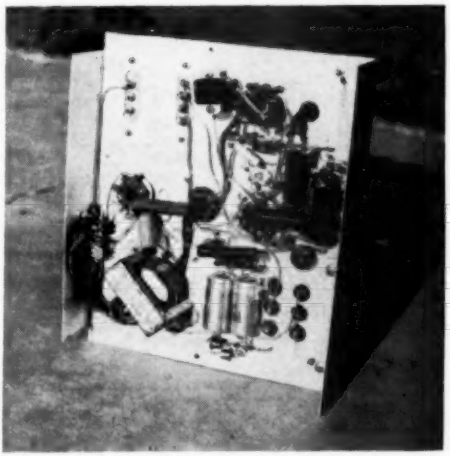
Note the clipping depth control (1 meg pot) between the first two sections of the 6C10. This is located on the front panel, and by rights should appear in Fig. 3; however, since it's such an integral part of the preamp it is shown here instead. The 47K resistor from the bottom of the pot to ground allows the control to be turned all the way "off" to remove clipping, without killing the audio. With the control all the way "on" and a high-output ceramic mike, you'll get about 30 db of clipping. The local gang seems to like it best with the pot about halfway open, which is approximately 10 db.

The grid-return and biasing arrangement on the cathode follower might have been a bit different had this not been the result of a late modification as mentioned earlier. We simply lifted the ground end of the cathode resistor and the grid return to a tie point, then took the plate-load resistor and moved it from the plate circuit to go between this tie point and ground. It seems to work nicely, with no particular pains taken to optimize the cathode-follower design.

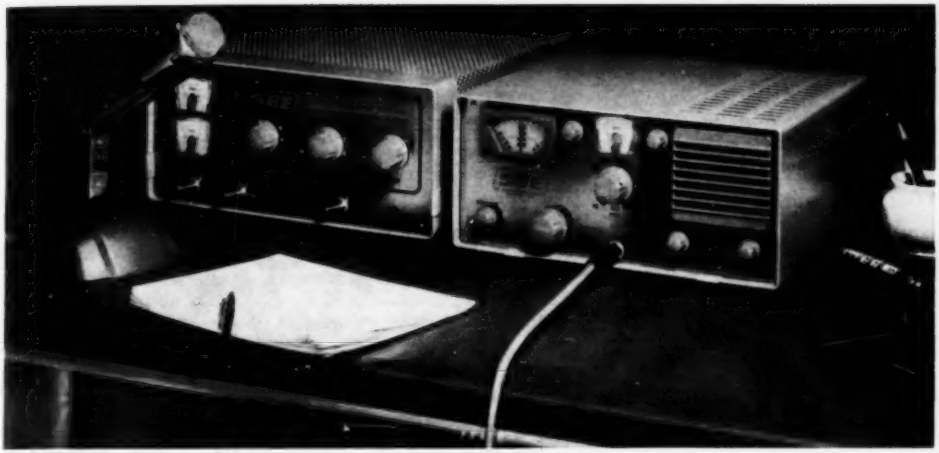
The cathode follower feeds a rather conventional 6AL5 dual-diode peak clipper; clipping level is set by the 250K pot from the most-filtered dc source to ground. We used a subminature pot because we had it on hand; any kind will do nicely as there is virtually no power dissipated here. No bypass is necessary because the 47K resistor to the plates isolates them and the dc line is filtered rather heavily.

The clipper feeds a low-pass filter which was taken from the ARRL handbook almost without change. The Merit C-2985 is a 20-henry, 15 ma choke, and we have used it many times in this circuit; no substitution can be guaranteed. Using the 270 mmfd mica capacitors shown gives a cutoff frequency of 2500 cps, which is about right for natural balance. The low frequency components have already been trimmed back by the 500 mmfd/1 meg grid capacitor/resistor combinations in the 6C10 stages.

Following the filter is the phase splitter;



Bottom view of audio/power module, showing nothing in particular except general layout we used.



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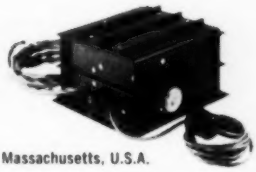

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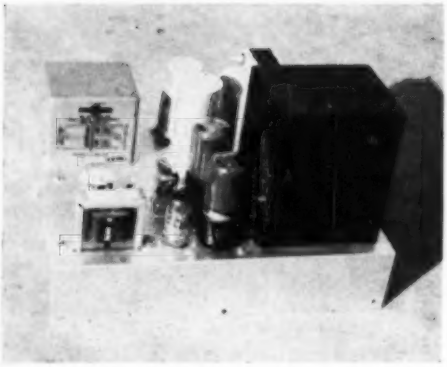


Top view of audio/power module. Small gadget between the two miniature tubes is shaft and lock-nut of clipping-level potentiometer.

rather than using a driver transformer or any of the more common inverter circuits we picked the "long-tailed pair." This circuit is slightly rare in ham use but finds frequent application in hi-fi; it has less gain than some other arrangements but can handle higher voltages with less distortion.

In the long-tailed pair, a high-mu tube such as the 12AX7 is essential. One half acts as a combination conventional amplifier and as a cathode follower; the other half is a grounded-grid amplifier driven by the cathode follower. A high degree of negative feedback is inherent in the circuit, as is automatic balancing so that the output voltages are exactly equal and precisely 180° out of phase. Although it has only half the gain of some other circuits, the auto-balance feature and low distortion more than make up for it.

The long-tailed pair drive the 6V6 modulator tubes directly, through 0.1 mfd capacitors. The 6V6's operate in class AB1, with 15 volts fixed bias which is obtained from a voltage-doubler tied to the filament supply line. We used Lafayette SP-137 200 volt diodes for this and the other low-voltage power supplies, but any equivalent type should work nicely.

An unusual feature in the modulator is the use of feedback taken from each plate back to the 12AX7 plates; this is the purpose of those 1 megohm resistors. They give about 10 percent negative feedback, which reduces the amount of tilt present on the clipped tops of the audio. Without the feedback, the waveform looked more triangular than square because of the small modulation transformer; with the feedback, audio quality is excellent.

The modulator cathodes are taken through pin 5 of plug 2 to the control circuitry, where they are grounded in the "fone" position of the mode switch and opened when on CW.

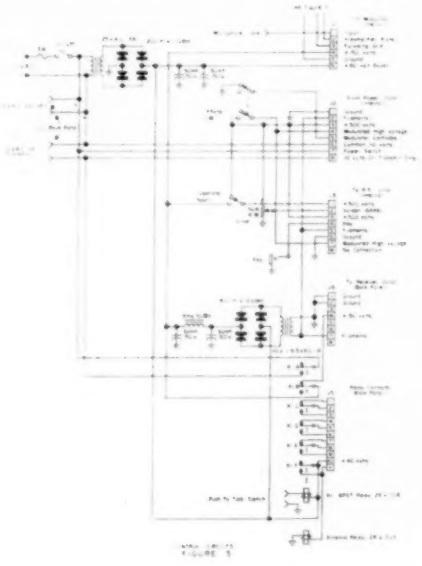
The power supply is more conventional; it uses a 250 volt transformer and 800-PIV diodes in the conventional full-wave hookup. Rather than grounding the center-tap of the transformer, it is taken through pin 6 of plug 1 to the relay-power supply for 40 volts of boost; we found this necessary with the small unidentified surplus transformer we used. It probably should not be necessary with a transformer of fully adequate ratings.

The current-limiting resistor is a necessity, and the 10 watt rating is also needed; a 33 ohm 2-watter burned up with a bright flash, because of the high capacitance in the filters and the heavy load current.

All power for the transmitter is brought out to plug 2, an octal connector on the subchassis flange, while the connections for the front-panel controls and mike jack come to plug 1, a 6-prong Jones type. Thus by unplugging these two connectors, the entire audio/power unit can be removed from the chassis for service or modification.

With this module out of the way, the rf deck came next. This uses a 6BA8 oscillator/multiplier driving a 6AK6 doubler which in turn drives a 6360 straight through as the final.

The 6BA8's pentode section is a conventional harmonic Colpitts oscillator using 8 mc rocks. The switch in the cathode allows use with



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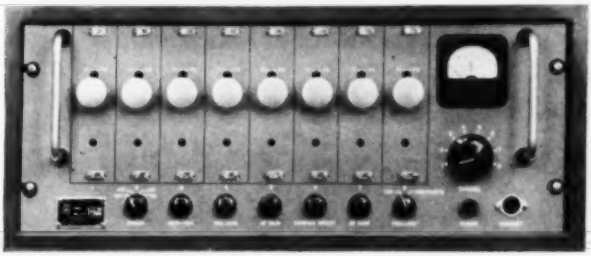

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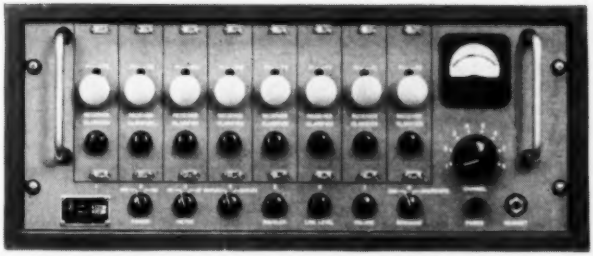

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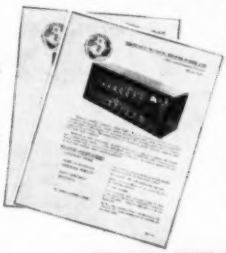

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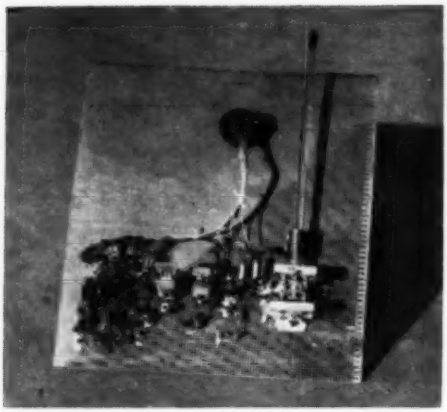

Bottom view of rf deck showing compact construction, coupling of stages, and neutralization of 6360 at socket. Tuning-tool extension on plate capacitor shaft is temporary only; shaft will eventually gang-tune with 50 mc rig to be added in blank space to the front.

a VFO if desired. The two NE-2's regulate the screen voltage at approximately 120, to hold frequency stability and avoid "yoops" at the start of each transmission—and they do their job excellently. Adjustment of L1 and L2 is facilitated by TP—1 in the triode grid circuit; either a VTVM or a low-range milliameter can be plugged in here and the oscillator adjustments peaked.

The triode section is a tripler from 24 to 72 mc, rather than the more usual doubler. We wanted maximum efficiency in the driver stage so decided to double there instead of here.

TP-2 is for peaking of L3 and L4. Coils L1 and L2 are wound on J. W. Miller type 4300 forms, with red cores, while L3 and L4 are on the same forms but using white cores.

The grid circuits may appear a bit unusual; we felt that overall efficiency would be a bit better if the bypass was put at the cold end of the coil rather than in the hot lead between coil and grid as is the more common custom. The results seem to bear out this contention; drive is adequate, even with only three tubes.

The 6AK6 doubles from 72 to 144 mc, to drive the final straight through. This tube may surprise you a bit. Though rated only for audio service with a maximum of 180 volts on either plate or screen, it's a real VHF powerhouse at 300 to 400 volts. Previously, we had tested the 6AK6 on 50 mc with 400 volts on both plate and screen, with power applied for 24 hours consecutively (into dummy load). Output at the end of the test was the same as at the beginning—7 watts. And though the screen was glowing white all the time, it showed no signs of giving up. But one warning—even with the heat dissipating shield we used, the bottle gets HOT. Don't even try to touch it until it cools off after use.

The plate circuit of the 6AK6 merits mention. It's of the balanced variety, mainly to allow direct inductive coupling to the 6360 grid without using standoffs. The piston trimmer serves to balance out the output capacitance of the 6AK6, but seems to make little difference. TP-3 in the 6360 grid circuit is used to peak C5, C6, and C8. It should give a reading of approximately 50 volts with a VTVM in use.

The 6360 has a number of unusual features; most unique is its grounded-line plate circuit. Rather than using the conventional series-fed tuned line, we used shunt feed with a Z-144 rf choke in each plate lead, and a .001 capacitor from plate to line. This removed dc high voltage from the exposed lines, allowed use of smaller spacing in the tuning capacitor, and permitted us to ground the cold end of the line without worrying about a high-current bypass capacitor. It also led to the amazing efficiency, but more about this later.

Before getting to the plate circuit, though, let's look at the rest of the stage. The grid circuit, you'll notice from Fig. 2, has no bypass capacitor. This allows the tank to reach its own capacative balance so that each half of the tube contributes equally to the output. Present but not shown in the schematic are neutralizing wires, although the 6360 is supposed to have built-in neutralization. We found that in this rig, it is *over* neutralized, so we had to do some work at the socket. The neutralizing wires consist of ¾ inch lengths of bare hookup wire soldered to each plate pin (6 and 8), crossed over but not touching at the center of the socket, and spaced about 3/8 inch from the grid pins (1 and 3).

Neither is there a screen bypass capacitor; this one is built into the tube also, and it works nicely. Don't put on an external one or things won't work right.

Another unusual point in the screen circuit is the 12K-33K bleeder from modulated high-voltage to the unmodulated 300 volt supply, with the screen supply taken off at the tap.

This came directly from the manufacturer's poopsheet (Amperex) and sets the proper percentage of screen modulation for good linearity; this is about 65 percent if the plate is modulated 100 percent. The large output capacitor in the 300-volt supply on the audio power module keeps any of the modulation

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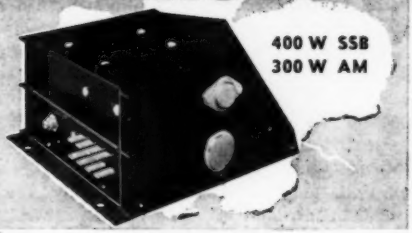

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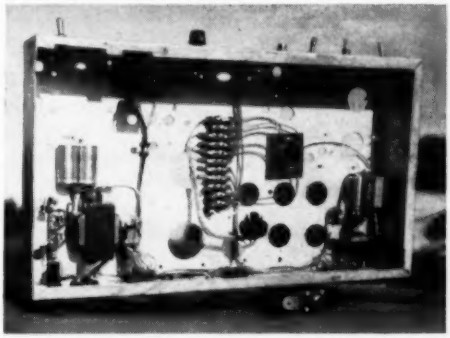
from getting back to earlier stages of the rf deck.

All stages are inductively coupled or double-tuned with 1-turn coupling links. This makes for minimum TVI and maximum transfer of energy on the desired frequencies only. The rig has been operated less than 5 feet from a TV set which was tuned to a deep-fringe signal on Channel 5; no trace of TVI resulted. And this without any shielding on the top!

Now back to the 6360 plate circuit and that efficiency. After the rig was put together and we were turning it up the first time, we found that touching the plate line with a screwdriver at one point would more than double the power output indicated on the meter, with no change in plate input. This led to experiments with a wire soldered to the ground plate and bent near the line for capacity balancing. No good. But when the wire was moved out about half an inch from the line-to-plate junction, and then connected directly to the line part way up, we quickly found that at several points we could get the high efficiency again. That's why the wire seen in the top view is there, and that's how we got the efficiency. Though we haven't figured out yet just exactly what's happening we believe that the "fanning out" of the line raises the amount of current flowing at the ground end near the link, in turn raising the amount of power coupled out.

With both audio/power and rf modules ready to use, the next step is the control circuitry. Its schematic appears in Fig. 3, and has a slightly disorganized look. The circuits in-



Interior of chassis, showing control circuitry and power supplies. Also shows swiss-cheese condition of chassis which was salvaged from junkbox. Front-panel controls, left-to-right, are CW-fone switch, drive control, spot-operate switch, plate tuning, clipping depth, and power on-off.

clude a 40 volt dc supply to allow use of 28 volt dc relays for all controls, the relays themselves, a 150 volt supply for the associated receiver, and all front and rear panel controls. These controls include a mode switch, a drive control, a spot-operate switch, the clipping depth control mentioned earlier, and the main power switch. On the back panel are receiver power socket J4, the key jack, the antenna relay, a 115 volt outlet which is live only when transmitting, the mike jack, the push-to-talk control jack, an 11 contact socket (J5) for unused relay contact access, another 115 volt outlet controlled by the power switch, and a 3 amp fuse.

None of this circuitry is critical; you can tell what each part does by studying the schematic. We simply crammed it in where space was available, wired the whole thing together following commercial practices, then cabled the wiring. The big terminal block appearing in the photo isn't shown on the schematic as it is merely a tie point for various connections.

Future plans for this little rig include two additions: the rf deck, as you can see, has plenty of space left over. This hurts our Scotch spirits, so we're going to put a 50 mc rig on the bottom and add a 432 mc tripler on top. The 50 mc rig will gang-tune with existing 2 meter section. The result will be a true table-top tri-bander, VHF variety.

But in the meantime, just as is, this rig is staying busy at K5JKX. Only complaint from W5PPE is that it gets the same signal reports as his 100 watt 5894 rig! And that's the burden the designer of a top-efficiency VHF rig has to bear!

. . . K5JKX
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Transistorized RTTY Converter

Robert Corbett W1JJL
46 Prospect Street
Torrington, Connecticut

In an effort to develop a simple, inexpensive RTTY converter, I went through several different models, none of which worked too satisfactorily, until I came upon the circuit of Fig. 1. This is about as simple as you can get and still obtain good readable copy on the ham bands.

Audio from your receiver is fed through T1 and is limited to a set value by the 13K resistor and the two 1N34's connected across the secondary. The first 2N269 is self-limiting by virtue of the unbypassed resistor in the emitter circuit. Also, you will note there is a fairly large value bypass condenser connected between the collector and ground of this same transistor. The purpose of this is to reduce high frequency noise and signal leak-through.

The second 2N269 is utilized as an amplifier and provides more than enough gain to drive the 1N34 rectifier. Notice that the collector of this transistor is connected to the center tap of the toroid rather than the outside. This is to reduce the loading effect of the collector impedance on the selectivity of the tuned circuit.

Transistor TR3 acts as a dc amplifier and

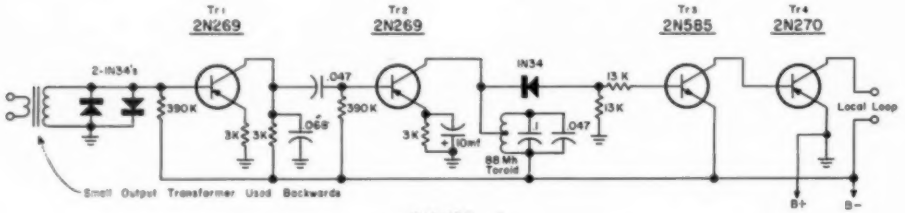

FIGURE 1

13K Resistor across secondary of transformer not shown in schematic.

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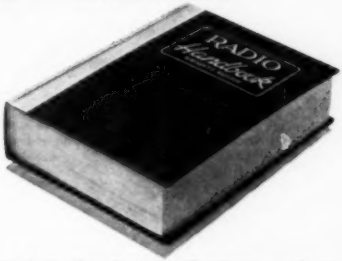

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FIGURE 2

builds up the output of the rectifier to a value high enough to key the output transistor. The two 13K resistors in the base circuit of this transistor are the only really critical parts of the unit. I would advice against changing the value of these as they set the current of the output loop. Also it is easily possible to destroy transistor TR3. If you must experiment with these values connect a milliammeter in the emitter circuit of TR3 and watch the value of this current closely. Also be sure that the 1N34 rectifier is connected to the junction of the two resistors not to the upper end, as this also controls the amount of current drawn by this transistor.

With a 12 to 15 volt supply connected the local loop current will be between 60 and 65 milliamperes and can be used to key the machine magnet directly. The tuned circuit is set to the space frequency and when a signal is received, the current in the local loop drops to almost zero.

My version of this unit is built on a home made printed circuit board and the layout is shown in Fig. 2. The full size dimensions are 3 x 9 inches. For connection to the external circuits I use 4-40 bolts and nuts with the heads of the bolts soldered to the printed circuit.

Any inquires will be answered, but please, SASE. Total cost should be about $15 if everything is purchased new.

. . . W1JJL

Modulation Measurement the Simple Way

Jim Kyle K5JKX
1236 N. E. 44th St.
Oklahoma City, Okla.

Through the years, many methods of measuring AM modulation percentage have been described. Some have been simple but only approximate in result; some have been precise but more than just a little complex.

The method described here has not been reported in the amateur press during the last 5 years at least; it is both simple and reasonably exact, and requires the use of only two items of test equipment. While neither is especially common in the usual ham shack, neither are they especially uncommon.

The test equipment required consists of a dc scope of any variety, and an rf probe for the scope.

To make the measurement, simply connect the probe to the scope and connect the probe in parallel with the antenna terminals of the transmitter. The output of the probe will consist of an ac component which represents the modulation, and a dc component which corresponds to the average voltage or carrier component.

With no modulation, the trace on the scope screen will consist of a line at some definite voltage level as shown in part A of Fig. 1. This

line becomes the zero reference for the rest of the measurement.

Now, with modulating signal supplied, the scope trace will shift upward to look like either part B or part C of the figure.

The percentage of modulation is determined by comparing the positions of peaks in the audio waveform with the former zero reference line as well as with the midpoint of the new trace. If the peaks reach down to the original zero reference, you have 100 percent modulation. If they reach halfway down (as in part B of the figure) you have 50 percent. Other distances are in direct proportion. For instance, if the dc level rises by 10 squares with modulation, but the ac peaks extend only two squares either side of this, the modulation percentage would be only 20 percent.

This test measures modulation in only one direction; to measure modulation on peaks of opposite polarity, you would have to reverse the polarity of the crystal in the scope's rf probe. A typical probe schematic is shown in Fig. 2; for full modulation checking it would probably be worth-while to build two of these, identical except for reversed crystal polarity. You would then be able to check modulation percentage in both the positive and negative audio peaks.

. . . K5JKX

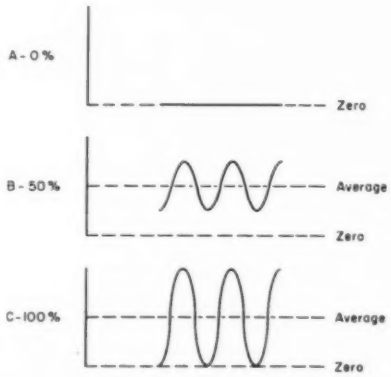

FIGURE 1

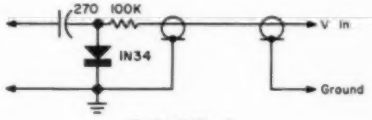

FIGURE 2

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A high performance, transistorized,

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This report describes a transistor type converter capable of excellent noise and cross modulation performance at 144 mc. It employs four MADT transistors and is crystal controlled. An *if* output frequency of 28 to 32 mc permits the use of a good high frequency receiver capable of tuning this range as the tunable *if* system.

Circuit Description

The common emitter configuration is employed in the rf amplifier, mixer, and crystal oscillator circuits, and the common-base configuration for the frequency tripler stage.

A 2N2398 is used as a neutraized rf amplifier. Coils L_1 and L_2 in conjunction with capacitors C_1, C_2 and C_3 form the antenna input circuit. Shunt capacitor C_1 tunes the circuit to resonance. C_2 and C_3 form a capacitive transformer to match the 50 ohm antenna to the base input. Capacitor C_5 together with neutralizing capacitor C_4 form the neutralizing circuit. Collector tuning is accomplished by capacitor C_6 and coil L_3. Variable resistor R_1 provides manual gain control by a method known as forward gain control. Switch SW_1 permits emitter resistor R_2 to be either bypassed in the noise figure position or not by-

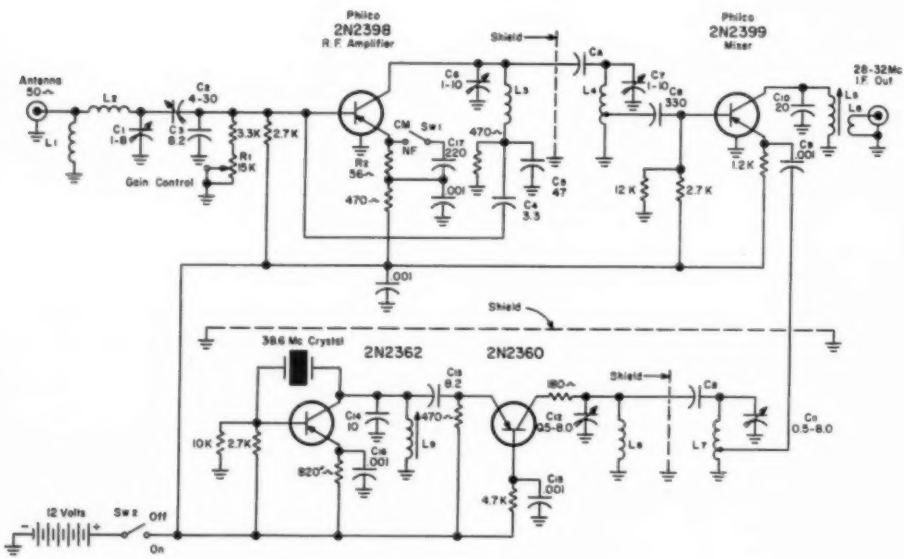
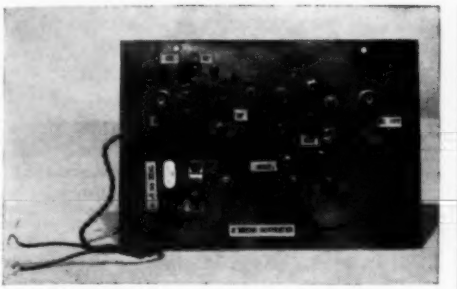


FIGURE 1



passed in the cm position. In the noise figure position, the amplifier operates with the emitter fully by-passed, thus providing best noise figure performance.

In the cm position switch sw_1 removes the by-passed capacitor C_7 resulting in some emitter degeneration, thus improving the cross modulation performance of the rf stage. This improvement in cross modulation unfortunately is accompanied by a 1.5 db degradation of the overall noise figure.

Switch sw_1 should be a quality type with very low "between-contact" capacity (less than 15 pf).

The output of the rf amplifier is loosely coupled to the mixer tuned circuit through capacitor C_A. This capacitor is formed by the small amount of capacity existing between an insulated piece of wire which has been soldered to the collector tank of the amplifier and the high potential end of coil L_4. The insulated portion of the wire is placed on the high potential end of L_4 to form a capacitor having a value of about 0.1 to 0.2 pf and is held intact by dropping some plastic cement on the junction.

The mixer input circuit consists of capacitor C_7 and coil L_4. A 2N2399 is used as the mixer transistor. The 30 mc output is coupled out of the collector to the 50 ohm load-through a tank circuit consisting of shunt capacitor C_{10} and variable inductor L_5 and a link coil L_6.

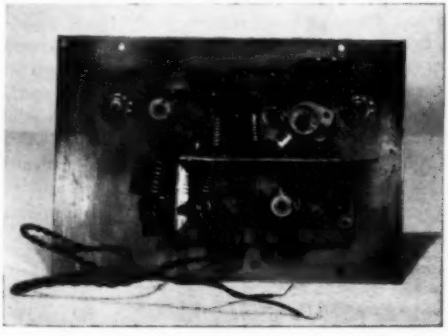


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Chart 1

RF Amp.	Mixer	Oscillator	Tripler	Bleeder Current	Total Current
1.8 ma	1.4 ma	4.0 ma	2.0 ma	2.3 ma	11.5 ma

Chart 2

Frequency (desired)	Frequency (undesired)	Signal level for 1% with R_2 bypassed	Cross Modulation Index with R_2 un-bypassed
144.5 mc	150.5 mc	* 3.7Kμv	* 7.1Kμv

The local oscillator power is injected at the emitter terminal of the mixer through by-pass capacitor C_9 and a tap on coil L_7. Capacitor C_{11} tunes this circuit to 116 mc.

This tank circuit is loosely coupled to the tripler tank through capacitor C_B which is made up in the same fashion as capacitor C_A. The class "C" tripler uses a 2N2360 transistor and obtains its excitation from the crystal oscillator stage through a series matching capacitor C_B. Shunt capacitor C_{10} and coil L_9 tune the oscillator collector circuit to 38.66 mc. A 2N2362 is used in the oscillator stage.

Chart 1 indicates the approximate current drawn by the various stages of the converter.

Results

The overall power gain of this converter was measured to be 32 db with a noise figure of 3.9 db when switch sw_1 is placed in noise figure position. By placing switch sw_2 in the cm position, the observed noise figure was 5.4 db. However, the cross modulation characteristics were improved. (See Chart 2 for data)

COIL DATA

L_1 = 2 turns #18 tinned copper wire 3/16" I.d.
L_2 = 3 turns #18 tinned copper wire 3/16" I.d.
L_3 = 9 turns #18 tinned copper wire 3/16" I.d. winding length 5/8"
L_4 = 9 turns #18 tinned copper wire 3/16" I.d. winding length 5/8" base tap 1 turn from low potential end.
L_5 = 22 turns #28 nylclad copper wire on 1/4" ceramic form. C.W. with powdered iron core (VHF grade).
L_6 = 3 turns #28 nylclad copper wire over low potential end of L_5.
L_7 = 7 turns #18 tinned copper wire 5/16" I.d. W.L. = 1/2".
L_8 = 7 turns #18 tinned copper wire 5/16" I.d. W.L. = 3/4".
L_9 = 18 turns #28 nylclad closewound 1/4" dia. form. with powdered iron core (VHF grade).

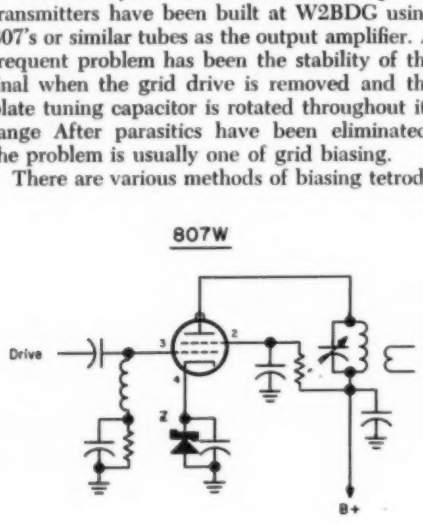
* Across the 50 ohm Converter Input.

A New Method of Biasing Tubes

Robert Schuetz W2BDG

Over the years a number of low power transmitters have been built at W2BDG using 807's or similar tubes as the output amplifier. A frequent problem has been the stability of the final when the grid drive is removed and the plate tuning capacitor is rotated throughout its range After parasitics have been eliminated, the problem is usually one of grid biasing.

There are various methods of biasing tetrode final amplifiers such as grid resistor, cathode bias, or fixed bias. In order to protect the tube in the absense of grid drive, some form of protective bias or a clamp tube arrangement is often used. At one time a 45 volt battery supplied bias, but now a clamp tube is frequently used.



One of the recent developments in semiconductor electronics has been the zener diode, which has the very useful property of maintaining a constant voltage across the diode when varying currents are flowing through it. A zener diode of the proper voltage and wattage rating can be connected between the cathode and ground of tubes operating with varying cathode currents to give a constant value of grid bias. The following circuit shows how bias is obtained for the driver amplifier of the transmitter at W2BDG.

The zener diode–Z–is used to supply protective bias to the amplifier by maintaining the cathode 43 volts above ground. The remainde

Detroit, Michigan: "Does an excellent job of swinging a 20-40 combination and stacked Finco 6-2 beam."

San Diego, California: "I am well pleased with the rotor to date, holds and turns stacked 40M and up beams in 50 mph winds with no difficulty."

Los Angeles, California: "I have personally installed 3 other HAM-M Rotors in the past 3 years (all of them OK) so I feel that I'm buying the best."

Houston, Texas: "Wonderful! Was using the AR-22 (the CDE TV automatic) and it did a fine job for 4 years, but put up a larger beam and needed more power."

Anchorage, Alaska: "Due to below-zero weather, it took quite a while to get up but the last couple of weeks it has proved perfect. Wish I had one years ago."

Alamo, California: "Works very well and purchased on recommendation of my friend who has been using one for 4 years and likes it quite well."

Swarthmore, Pa.: "Am very pleased with the results. More than meets my expectations."

Pluckemin, New Jersey: "The HAM-M rotates and two TR-15's tilt the 6-foot parabola for 432 and 1296 mc."

Chicago, Illinois: "It really does the job."

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(a sampling of mash notes received by our HAM-M)

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of the operating bias is supplied by a grid resistor. With plate and screen voltages and no grid drive applied to the stage, the cathode current is less than 10 milliamps and the stage is completely stable. The particular zener diode is a 1N2993 (1OM43Z5) which is rated for 43 volts and 10 watts. The cathode of the diode is connected to the mounting stud, and all that needs to be done is to drill a hole, mount the diode to the chassis, and connect the anode of the diode to the cathode of the tube. The usual cathode by-pass capacitor (about 0.005 mf) must be connected across the diode. The wattage rating of the diode is determined by multiplying the voltage drop across the zener diode by the maximum current through it. The diode having the next higher wattage rating and the proper voltage rating is selected. When high wattage diodes are being used, care should be taken to insure that a proper heat sink is supplied.

Zener diodes can be used for biasing class B amplifiers and in other applications. The price of zener diodes is a deterrent to many amateurs, but the price is being reduced and the simplicity of their application makes them very useful.

. . . W2BDG

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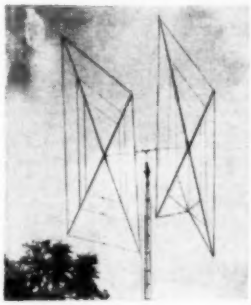

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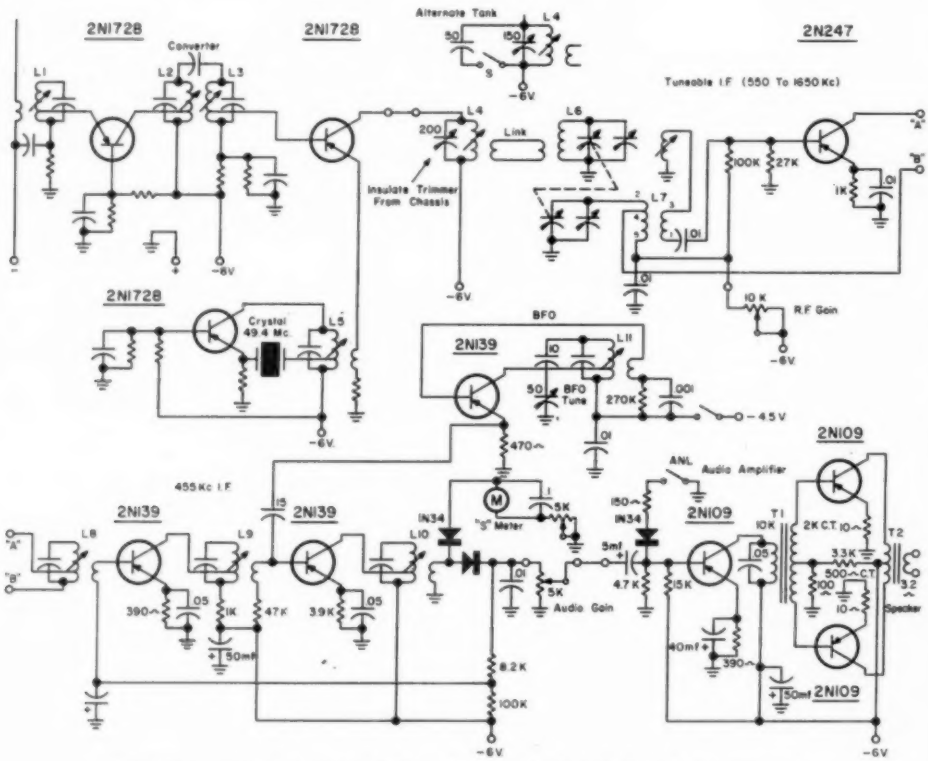
Transistorized 6 Meter Receiver

Capt. John Sury W5JSN

Do you need a 6 meter receiver that is small and compact and has sensitivity as well as selectivity? Here is a challenging project. The receiver has 10 transistors, a crystal controlled front end, double conversion, and a bfo for CW and SB reception. All of this is installed on printed circuit boards. You know the old caution to take: keep leads as short as possible. On this project, forget it. The printed circuit takes care of those things for you. The receiver does a fine job on AM, CW, and SB. Total power supply is 4 large flashlight batteries, which do not need replacing very often. Idle current is approximately 15 ma and peaks to approximately 30 ma with an automatic noise limiter to boot. The ANL sure comes in handy around congested areas where ignition noise is a problem. It measures 9 inches wide, 6 inches high, and 8 inches deep. The miniaturization ham can build this receiver a lot smaller, because there is plenty of room to spare in the one built by the author.



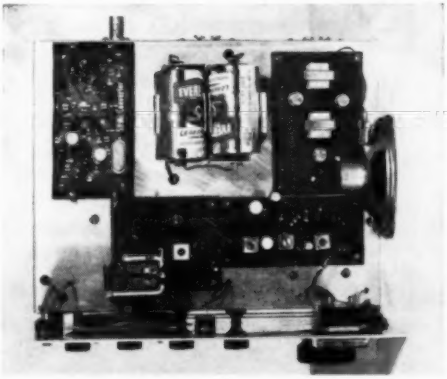
Note: Converter board insulated from chassis with phenolic board on converter is negative and chassis is positive.

All printed circuit boards were constructed except for the front end crystal controlled converter, which was purchased at Irving Electronics in San Antonio for a little over $3. This included the board and all the coil forms—a very fine buy. The author was a little impatient, so he did not bother to build the front end from scratch. The tunable if is the Broadcast band from 550 to 1650. This will cover 1 mc with good sensitivity and selctivity.

Only 1 transistor is employed by the tunable if; one thing it saves is 1 transistor for some other location as well as saving time trying to lick a stability problem in the oscillator. The tunable converter used in this receiver is rock stable.

A 2-stage 455 kc fixed if was used. The ordinary run of printed circuit if cans for transistors, obtained from several of the electronic warehouses, were used. They are small and compact and allow easy mounting on the printed circuit board.

The bfo employs 1 transistor. The circuit appears to be very stable. The author is sure a crystal controlled bfo would have more stability; although once an SB station is tuned, no further adjustments are required.



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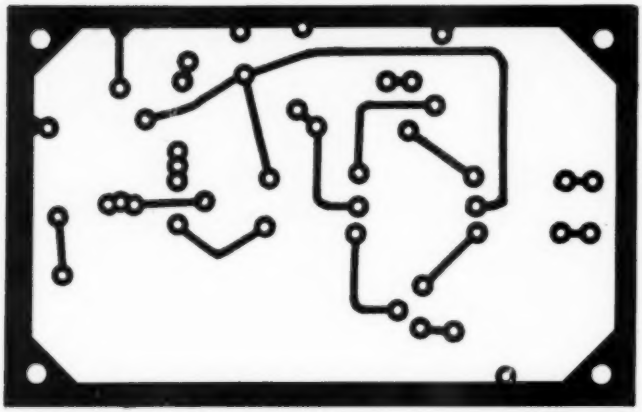
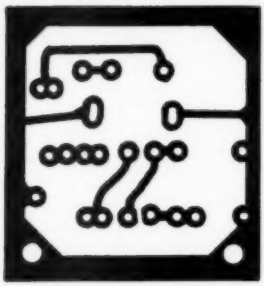
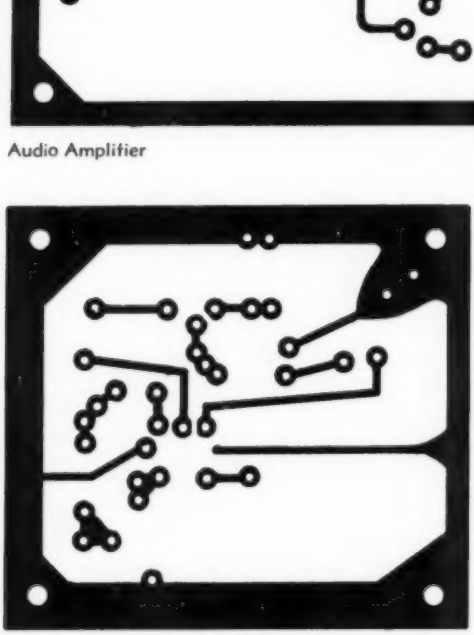


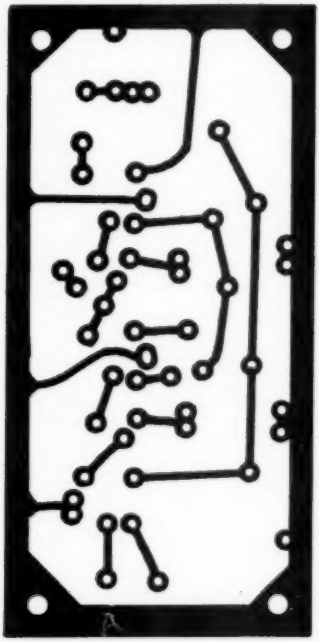
Audio Amplifier



BFO

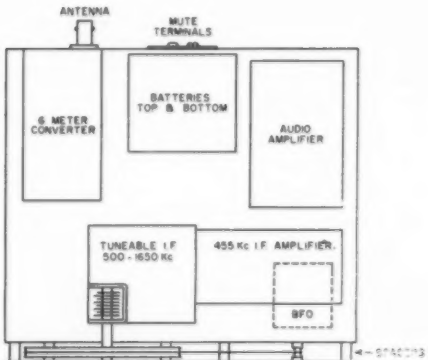


Tuneable if Amplifier



455 kc if Amplifier

Boards shown actual size



Brief Instructions

Cut out the above boards. Lay the patterns over the board desired to be made. With a scribe mark holes. Drill holes with a #56 drill. Paint resistant with a small brush as pattern indicates. Put each solution in a plastic container and place board face down. It requires about 45 min. to complete. It may require a little longer. Remove the board and remove restant with thinner or gasoline. Wash board with soap and water. Enlarge the holes which are required to fit some of the components. Solder the components in place.

The audio amplifier is a standard class B push-pull 3 transistor amplifier. There is a slight forward bias applied to the 2 output stages, so the transistors operate in the linear region of their own characteristics and reduce cross over distortion. Any 3.2 ohm speaker will do a good job for the listening end.

The printed circuit board construction technique will not be covered here, since there have been many articles published on this art. Each section was constructed separately and mounted on an aluminum chassis 9 x 7 x 2 inches. Refer to the photographs.

By scrounging a 3-inch pulley from a local TV technician, the vernier dial was constructed. Just about anything will do the job; but for fairly easy SB tuning, the ratio for the tuning capacitor should be at least 8:1. Cut out a circular piece of heavy paper. Cement loosely to the pulley, and calibrate the dial. Remove the paper, and mark the calibrations permanently with India ink. After it dries, spray it with a plastic spray; and after this has dried, re-cement to the pulley.

Audio Amplifier

Parts in the amplifier are quite common. The driver transformer is 10k primary and 2k secondary CT. The output transformer is 500 ohms CT and 3.2 secondary. Instead of cutting holes in the printed circuit board for the sockets, small holes were drilled so that the socket lugs might be soldered into the board. The transistors may be soldered in permanently but this does not allow for changing around the transistors to get the best output. Even the same type of transistors will not all have the same alpha or beta values. The printed circuit layout is full scale. Refer to schematic in placing resistors and other components.

If Amplifier

The if coils are minature Calrad, type PV-03 and PV-104. If other types are used, the printed board will have to be changed. Here again, the transistors were not soldered in permanently.

Tunable IF

Only 1 transistor is used here. A transistor with an alpha frequency cutoff of at least 9 mc should be used. For good operation, the transistor should not be operated at a frequency any higher than 25% of the alpha cutoff frequency. The 1 transistor serves as the oscillator and mixer. A Miller #2021 oscillator coil and a #2110 variable condenser mounts in place. For the mixer coil, the Miller #2007

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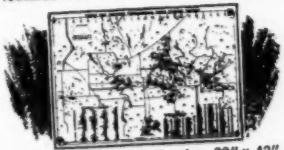

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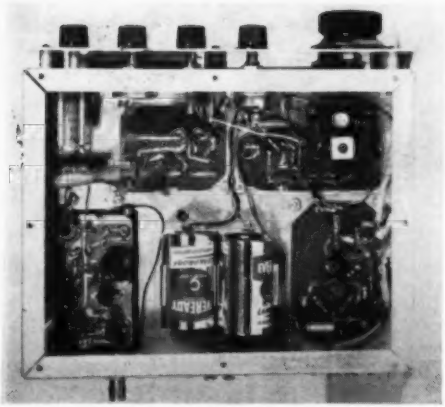


loopstick coil tunes 550-1650 kc's.; this is the if tunable range. Any coil with the same inductance can be substituted.

50 mc Converter

This is a 3 transistor converter, #34, by Dan Meyer, which is sold by Irving Electronics of San Antonio. The kit includes all of the coil forms and the printed circuit board. One word of caution if this converter is used: the outer part of the board has to be insulated from the chassis because of the polarity. By using this converter, the author saved a lot of time. A third overtone crystal of 49.4 mc will give 50-51 mc coverage. The output coil is wrapped with 120 turns of Litz wire. A 200 mmfd variable capacitor is placed in shunt with the output coil to be used for peaking the signal. The author only had a 150 mmfd Trimmer, so a switching arrangement was made to parallel a fixed 50 mmfd capacitor. With the 50 in, it coverd the low end of the band; and with it out, it coverd the upper end of the band. Approximately 8 turns is all that is required on the oscillator coil. Link coupling between the mixer coil, and the converter output coil seems to work the best. Three turns over each coil is sufficient. Any more turns than 3 for the link broadens the tuning as well as overloads the tunable if.

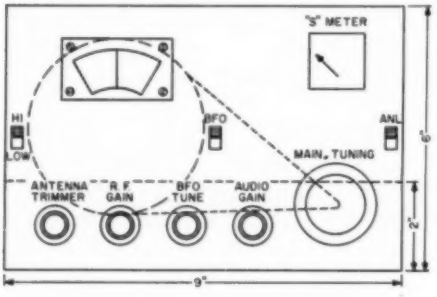
Bfo

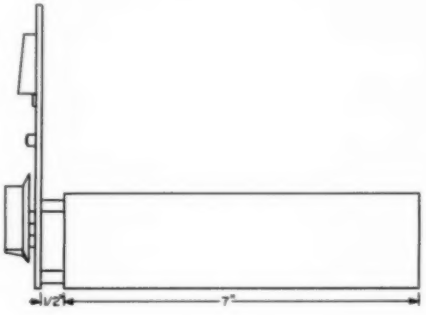
Let the board and schematic be your guide. The coil is a Lafayette MS 268 if coil. For bfo, batteries, and speaker locations, refer to photographs.

Alignment

The alignment of the 455 kc fixed if and the tunable if (oscillator mixer) will not be covered. Any handbook covers this procedure quite thoroughly. This part is only a standard BC receiver (550-1600 kc). When the receiver is ready to fire up with the 50 mc converter installed, it is ready to align for 6 meter operation. This is a simple procedure. The signal generator lead can lay loose on your work bench. Set it on approximately 50.5 mc. Tune the receiver for this signal; start with the front coil, and start peaking. Make sure the crystal is oscillating. If a meter is put in series with the batteries, the curent will change when a finger is placed on the oscillator coil. A vacuum tube voltmeter with an rf probe can be a good indicator for peaking the oscillator coil. Adjust the slug in the output coil with the peaking variable capacitor approximately half meshed for maximum signal. This will allow peaking at the lower, as well as the upper, section of the band. If better coverage is desired with less sensitivity, the converter can be stagger tuned. With the bfo on zero beat an unmodulated carrier from the generator, adjust the slug in the bfo coil with the 50 mmfd capacitor half meshed. By rotating the bfo knob on the front of the receiver to the left, it tunes USB; and rotating it to the right will tune LSB. The rf control is a 10k pot in series with the battery and the tunable if. This reduces the overall voltage on the tunable if, reducing the sensitivity and only changing the frequency slightly.

You will be amazed at the sensitivity, as



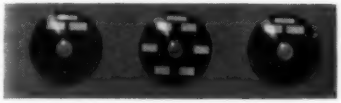


well as the selectivity, of this receiver. The S-meter is optional; (refer to schematic). The author has used the receiver for the past 3 months for local and also DX contacts. Muting is accomplished by disconnecting the battery by means of the contact points breaking on transmit on the antenna relay. Printed circuit board construction is here to stay; just try it, and you will agree.

. . . W5JSN

New Products

Illuminated Knob



Waters has been at it again. . . hardly a month goes by without something new from Bob. This time it is an illuminated Knob. Yep, a little light beam comes out and indicates the setting of the control. A red arrow also lights up on the knob. Pretty, flashy, eh? The mount on the regular ¼" shaft, which serves as a ground, and a wire goes from the knob to a 6 volt filament connection. $5. Check this at your local distributor. Should be great for mobile as well as the shack.

New Mike

Those of you who have used noise-cancelling microphones appreciate the advantages of this type of design. While it doesn't make a lot of difference around the normal ham shack, the background noise can be very objectionable in a mobile installation. Altec Lansing has just come out with a new hand-held noise-cancelling dynamic microphone which looks like a fine bet for the mobile ham station, the Dyna-Mike. It comes in models with or without a built in transistor amplifier. Watch for the Dyna-Mike at parts distributors or drop a note to Altec, 1515 S. Manchester Avenue, Anaheim, Cal.

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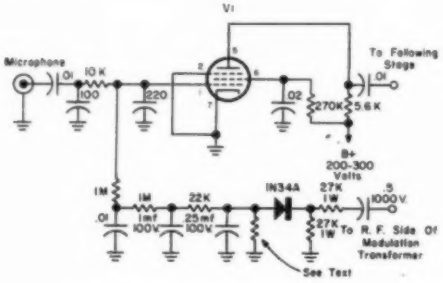
Speech Compression for Mobile Transmitters

Is your mobile modulator loafing, cheating you of talk-power that you can't afford to lose? Chances are that it is. In any AM transmitter 100% modulation is the accepted ideal; in a mobile transmitter it is an absolute necessity because of the more adverse operating conditions. Yet mobile transmitters, although fully modulated, are frequently short on audio. How can this be?

An AM transmitter adjusted for 100% modulation with sine-wave input will sound undermodulated with speech input. With sine-wave input, every peak results in 100% modulation, but with speech input, only the highest peaks hit 100%. Because the amplitude of human speech components varies wildly, the average modulation level of an AM transmitter is around 35 to 45%.

There are two ways to raise the average level of modulation without exceeding 100% on peaks—clipping and compression.

Speech clipping is quite effective, as is shown by its use in many fixed stations. However, inclusion of speech clipping in a modulator requires additional tubes, space and adjustments. Also, clipping a voice signal distorts it and produces harmonics which must be removed by a bulky L-C low-pass filter. For these reasons, speech clipping is seldom found in small, low-powered mobile transmitters.



Cheaper, easier to adjust and equally effective, speech compression is a natural for mobile work. Only one tube is required, and because no clipping occurs, no low-pass filter is needed. There is little distortion of the speech signal with compression, making it unnecessary to sacrifice fidelity for increased communications effectiveness, as is the case with speech clipping.

The most important advantage of compression is simplicity. The circuit takes up little space, and, if the first stage of audio amplification in your modulator is converted to a compression circuit, the compression tube is "free on board."

The circuit in Fig. 1 is modified version of the "Speak-Easy," and is similar to the avc circuit in a receiver. Designed around a variable-mu tube, the 6BA6, it has a wide range of gain and can be driven directly by a microphone.

In operation, low-level audio from the microphone is amplified by the compression tube and the following stages. High-level audio, taken from the secondary of the modulation transformer through blacking capacitor C^1 and voltage-divider resistors R^1 and R^2, is rectified by diode D^1 to give a negative bias voltage at the control grid of the 6BA6. An R-C filter network with a short time-constant smooths this bias voltage without distorting its syllabic variations. A high-energy syllable will produce a large negative bias voltage and reduce the gain of the tube for the remainder of that syllable's duration. A weak syllable will produce a small bias voltage, effectively increasing the gain of the 6BA6. This gives a modulator output in which high-energy audio peaks are compressed and low-energy peaks are amplified. This results in a higher average level of modulation, yet the audio peaks never modulate the transmitter more than 100%.

Cross Modulation and Overload Performance . . . .

IS ONE OF THE MOST IMPORTANT CHARACTERISTICS of a communications receiver– particularly one used on the crowded HF bands — yet most equipment specifications quietly neglect this factor and many receivers (even some expensive ones) behave just miserably in the presence of strong local signals nearby on the band. Not so with the SS-1R — its superb freedom from cross modulation and overload is an outstanding feature and a result of the completely new balanced mixer (7360) front end *with no r. f. stage*. The SS-1R performance in this characteristic (see specification below) means, from a practical point of view, that the key clicks and the splatter from the strong locals will disappear in all but the most impossible situations — when that kilowatt neighbor blasts in on almost the same frequency.

The SS-1R offers many other performance advantages over other receivers, such as direct *digital* frequency readout (no more mental arithmetic); exceptional frequency stability and accuracy; *Autocalibration* of amateur bands with WWV; crystal bandpass filters with unusually sharp skirt selectivity; and the excellent sensitivity of the unique low noise front end mixers. *Motor Tuning* control gets you from one end of the band to the other without the tedium of knob cranking. There are *different* accessories also: the SS-1S Noise Silencer for *elimination* of most impulse noise and the SS-1RS matching speaker. The SS-1T transceive transmitter and the S-1V Video Bandscanner will be announced soon to complete the SS station.

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ μv, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a **10** μv signal with 2.5 kc. selectivity, an unwanted **0.1 volt** signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack — 1 ms., **Slow** release — 1.0 sec., **Fast** release — 0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

The SS-1R, SS-1RS and SS-1S are available — ask your distributor for information or write

Squires-Sanders, Inc.

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Since this compression circuit is offered as a modification for existing equipment, and as idea material for future equipment designs, no construction information is given. However, some suggestions may be helpful.

If the first stage of speech amplification in your modulator a 6AU6 or other 7-pin minature pentode, this circuit can be incorporated by rewiring the socket and plugging in 6BA6. This circuit has sufficient gain for use with crystal, ceramic or dynamic microphones.

Since this circuit consits mostly of resistors and capacitors, they could be mounted on a small phenolic board and placed wherever there is room under the modulator chassis. Wires could then be run to B+, ground, modulation transformer secondary, and 6BA6 grid and plate. Shielded wire should be used for the grid and plate leads to prevent hum pickup and the possibility of feedback.

Of course the circuit could also be built as an outboard unit and used between the microphone and the transmitter. This would require bringing out high-level audio from the modulation transformer secondary to the outboard unit.

Although the emphasis is on simplicity, this circuit must be adjusted before it is used. With your transmitter operating into a dummy load, voice modulate it and observe the modulation percentage on an oscilloscope. Adjust resistor R^3 so that −4.5 volts appear across it when the transmitter is 100% modulated. An easy way to do this is to temporarily substitute a 10,000 ohm pot, rheostat-connected, for resistor R^3. Adjust the pot for −4.5 volts while holding a long syllable, such as aaaah or eeeee, and then remove the pot and measure its resistance. Replace it with a 10%, ½ watt resistor of the nearest commercial value. This completes the adjustment of the compression circuit.

As a check, speak loudly into the mircophone; the modulation level should not exceed 100%. Now speak softly; the gain of the compression tube should keep the modulation level up, although not necessarily to 100%.

With the addition of speech compression to your mobile modulator, you can be sure that your modulator is earning its keep and that your signal will have the necessary audio punch to get through when conditions get rough.

. . . W7SMC

Mobile Power Supply

Gus Gercke K6BIJ
Box 143
Weimer, Cal.

The following data was obtained experimentally:

1. Ferrite material used in TV yokes and flyback transformers is the same stuff they use in commercial toroids.
2. Single flyback core (larger size) or a single yoke core is about right size for 50 watts output operating around 400-600 cycles .
3. Sections can be stacked (see Fig. 1) for higher power.
4. Ferrite cores can be reduced to powder, mixed with Epoxy Cement (4 parts powder to 1 part of resin) and used to glue sections together, fill the cavities or even to mold your own cores.
5. About one turn per volt is right for a 150 watt transformer, two volts/turn for a 300 watt job.

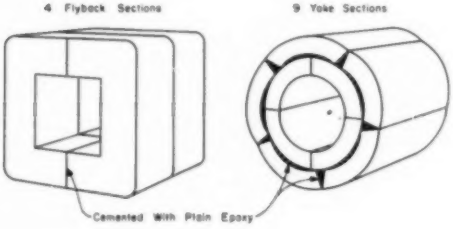

FIGURE 1

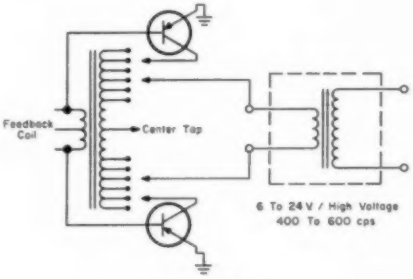

FIGURE 2

"—with a MATERIAL DIFFERENCE!"

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6. You do not need a high voltage secondary winding if you use circuit Fig. 2; this will reduce your coil winding to probably less than ten turns.
7. There is nothing wrong with "cheap" 40 watt transistors that sell for 50 cents to a dollar each. I bought about a dozen of them from various sources, and only one was bad.

If you match them—they can be paralleled, each pair producing about 75 to a 100 watts in a 12 volt system.

Power supply built according to a circuit (Fig. 3) is producing 100 watts at 110 volts and about 600 cycles. It is using 9 yoke core sections cemented together as explained in (4) to form a toroid. 1½ turns/volt ratio was used, primary has 18 x 18 turns Nr. 14 enameled wire, fedback winding has 12 x 12 turns Nr. 24, and the 110v secondary is 165 turns Nr. 20. Efficiency is close to 80–85%.

The circuit is a standard grounded emitter. It is using four 40 watt transistors mentioned above. It is suggested that resistors R1 and R2 are made variable and an ammeter inserted in series with the feedback centertap (it reads 1 amp) during preliminary testing. A good heatsink is essential.

The only other part requiring some explanation is Rx. It is one foot of bare copper wire, coiled around mica support, and running very hot—over 100 degrees Centigrade—at full power (wire size will depend on the power you are running). It does three things:

1. Tends to equalize currents through four transistors.
2. Acts as a fuse.

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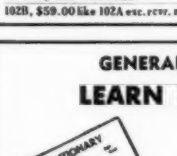

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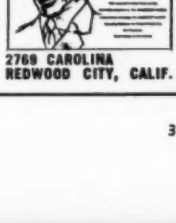

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2769 CAROLINA
REDWOOD CITY, CALIF.

3. Permits easy matching of the transistors, which is done by measuring voltage drop across each Rx resistor. I use test prods of my VOM in 2.5 ma position; all you need is a relative indication.

The 400–600 cycle output can be transformed to a higher voltage using separate transformer, or can be rectified using voltage doubling or quadrupling which is very easy at these frequencies. The cost of 400 cycle transformers is quite low, and they are several times smaller than their 60 cycle counterparts. This of course permits construction of about 200 watt supply for about ten dollars, depending mostly whether you have a friend in a TV repair shop.

. . . K6B1J

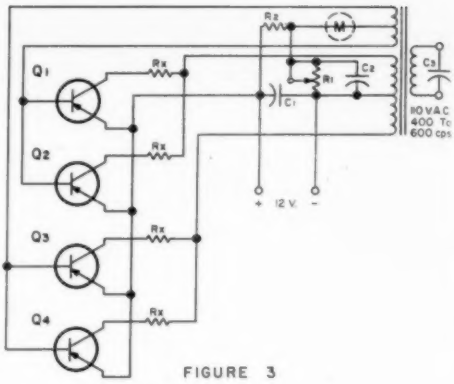

FIGURE 3

Fig. 3 Notes

Q 1, 2, 3, 4.—40 watt transistors see text.
R1—HO ohm 5 watt n series with 10 ohm rheostat.
R2—150 ohms 10 watts.
RX—Equalizing resistors, see text.
C1—1000 mfd 25 volts or more.
C2—50 mfd 25 volts.
C3—.01 1200V Mica.
M—0-5 amps meter (neded during testing only).
Toroid transformer constructed as in Fig. 2 (9 sections TV yoke cemented together).

Neatness Does Count

Harvey Rock WA2BWQ
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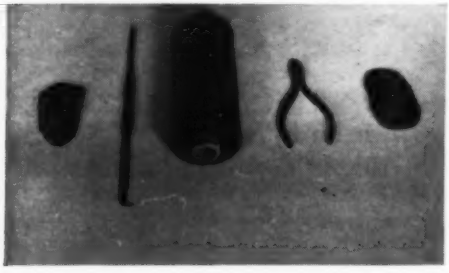
The status of "amateur" is no excuse for the sloppy wiring which seems predominant among hams. This is only the result of an unwillingness to spend a little extra time to get a neat layout. By overcoming this inertia, and the application of some lacing twine, this problem would be eliminated.



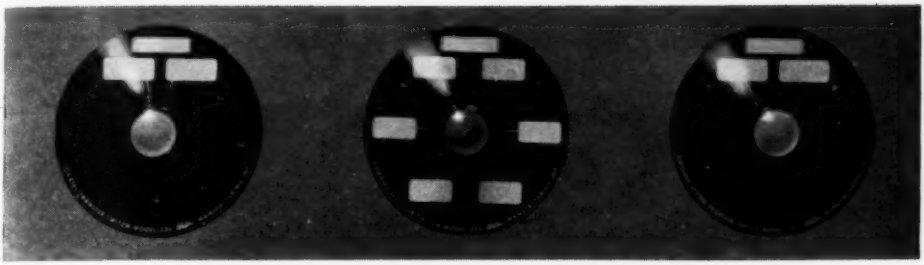
Lacing tools. L to R: Lacing mitt; hooked scribe; lacing twine; wire cutters; lacing mitt.

The basic lacing stitches are very simple. Anyone can lace, and the difference that it makes in your projects is well worth the time and effort.

It would be advisable to have some flat-braided nylon lacing twine, which is available surplus at very reasonable prices; if you buy it from your retail dealer, a 600-foot roll will cost about $9.00. Regular nylon twine will do. You'll need a pair of wire cutters because it is almost impossible to break the twine in your bare hands. A hooked scribe is used to pull the twine through tight spots.

The starting stitch is a clove-hitch knot, illustrated in Fig. 1.

Take a group of wires to practice on and lay them on the bench perpendicular to you. Cut a 12-inch length of lacing twine. Pass one end under the wire until the twine extends approximately seven inches on the left of the wires and five inches on the right. Bring both ends up vertically and pass the strand in your



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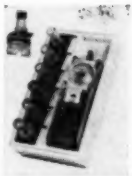

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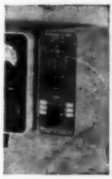

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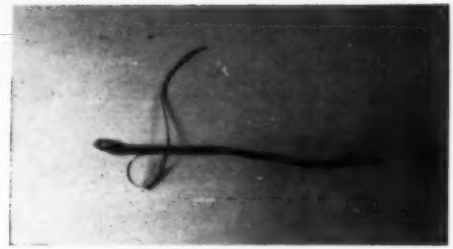


Laced cable, showing proper spacing and loop for next stitch.

left hand ("the left strand") behind the other strand (the right strand) and change hands. Then pass the left strand under the wires, leaving a loop, in front of the right strand, and then through its own loop. Pull tight and you have a clove-hitch knot. To be sure that you have a secure start for your lacing, make a square knot over the clove-hitch. The square knot is just to hold the clove-hitch in place. Practice this knot a few times to get the feel of it.

The lacing stitch, illustrated in Fig. 2, is equally painless. Make your clove-hitch, as before, but leave about two feet on the end where you previously left the five inch piece. After tying the square knot, cut off the short piece about ⅛-inch from the knot. The clove-hitch could be used throughout, creating a neat layout, however, lacing is much neater.

With the wires as before, grip the long length of twine between the thumb and forefinger of your left hand, about three inches from the knot, and double the twine back upon itself forming a circular overhand loop. This loop is parallel to the table and is to the left of the wires. Pass the end of the twine over the wires, then around and under them, and through the loop from the bottom. Grip the free end and pull tight. You have just made the lacing stitch. Practice a few more and try to space them evenly about ½-inch apart.

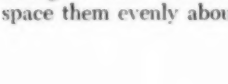


FIGURE 1
The clove hitch knot

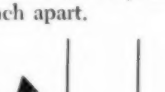


FIGURE 2
The lacing Stitch

To end, make one lacing stitch and then make another right next to it. With a scribe, or similar tool, force a space under the twine between the two stitches and pass the end of the lacing twine through the created space. Pull tight for the ending stitch. Cut off the excess leaving about ¼-inch after the ending stitch.

This lacing is known as a "Westinghouse" stitch. Each stitch pulls against the others and makes for a very tight cable. If you take out the stiches, you will note that they have cut into the wire, giving some indication of how tight the lacing actually is. That is the reason that I specified "flat-braided" nylon twine. When you pull the stitch tight you stretch the twine. Later, when the twine contracts, the knot is tightened against the cable.

All wires are placed together in a straight line and all turns are at right angles. Lacing is started at an extreme end and continues for the greatest possible length. A general rule of thumb is that the lacing twine be three times the length of the cable to be laced. With experience this rule can be modified for less waste.

Wires entering or leaving the cable are called branch-offs. These may be one wire or a group of wires, all at 90-degrees to the cable. A stitch is placed before and after every branch-off. Where a smaller cable branches-off the main cable, it is advisable to lace this separately.

The wires may be laid out before wiring and laced outside the chassis. This method entails some extra work, but makes final wiring much easier. Wires should be color coded for ease in trouble-shooting.

Lacing twine is inexpensive and mastery of the techniques involved will allow you to be proud of your home-brew equipment. *Neatness does count!*

RTTY Docket

The FCC, in Docket 15267, proposes that RTTY stations be obliged to give only their own call on CW for identification instead of both stations in contact as previously required. This certainly would simplify matters, making for less time wasted in the dual identification procedure and permitting the use of automatic CW identification systems which would expedite RTTY communications.

RTTY'ers would do well to drop a note to the FCC announcing their aproval of this docket. If this one falls through you can think of it every time you have to make that full dual identification and kick yourself for laziness.

¾ Meter TV

The easy way

Samuel Daskam K2OPI
R. D. 1.
Lebanon, N. J.

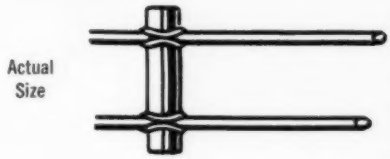
Before jumping into a new mode of operation, or even a new band, many amateurs prefer to put a minimum amount of expense and time into determining the characteristics of the band. This is especially true of the VHF bands where the level of station population and band useage varies greatly according to the location.

The 420 to 450 mc band has appealed to a great many people because of the variety of transmission modes available and the availability and ease of construction of high gain antennas. The lifting of the old 50 watt power limitation will also help build the popularity of the band. One of the easiest ways of taking a peek at the ¾ meter band is to use a commercially built UHF TV converter. It should be pointed out, however, that these converters will not offer the ultimate in UHF reception, but are only offered as a starting point.

Recently a new UHF TV converter (for TV Channels 14-83) was announced by Gavin Instruments (of Maverick filter fame) which looked promising on the 420 to 450 mc band. It consists of a tunable nuvistor oscillator using a diode mixer to convert the TV signal down to either Channel 5 or 6. A tunable filter which tracks with the oscillator keeps the local oscillator from going back out the antenna. The Gavin converter uses a 6CW4 as a tunable oscillator and a 1N82A mixer. Frank Hunter of Gavin told me, however, that the current production uses a microwave diode similar to the 1N21 which has a lower noise figure than the 1N82A.

An added bonus received in the Gavin converter is the rating of the power supply. Although the nuvistor oscillator draws only 6 ma. at 70 volts, the power supply is rated at 30 ma. This will allow the addition of a nuvistor rf amplifier ahead of the mixer which should give excellent results. Since isolation would be

WHY OPEN WIRE?



Very simple: lower losses.

Remember that 3 db is equal to twice the power. This means that if you lose 3 db in your feeder you are transmitting a maximum of half of your power. It also means that received signals are half as strong. Why throw away signal strength? Read this chart.

Line	Loss per 100 feet[1]	Cost per 100 feet[2]
RG-59U	**3.8 db**	**$ 4.65**
RG-11U	**1.8 db**	**$10.80**
300 ohm twinlead	**1.5 db**	**$ 1.12**
300 ohm tubular	**1.1 db**	**$ 2.36**
300 ohm open wire	**.4 db**	**$ 3.34[3]**

IT MAKES A DIFFERENCE, DOESN'T IT!

1. Loss at 100 mc. This increases with frequency. At 500 mc the RG-11U has 5 db loss per hundred feet to 0.8 db for the 300 ohm open wire.
2. These are the Saxton prices in 500 foot lengths. We make all of the above feedlines, plus hundreds of other types of feedline, and just about anything else you can possibly want made out of wire. Most distributors carry Saxton wire, make 'em part with some.
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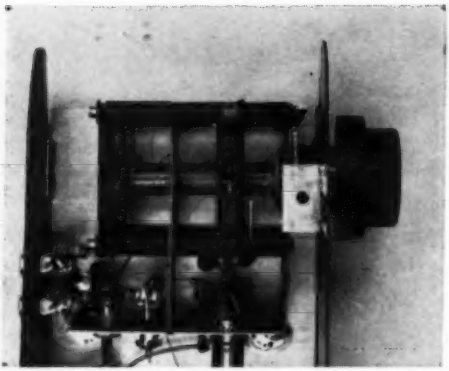


furnished by the rf amplifier stage, the filter could then be removed from the active circuitry without fear of the local oscillator signal going out the antenna lead and being radiated.

The only conversion necessary is to locate the filter section which is tuned by rotating the inner control shaft. The filter is situated at the rear of the two ganged tuned lines. Note that the filter will only rotate about 15 degrees with any specific setting of the channel selector, as it is restricted by a protrusion on the larger outside shaft.

Careful use of a hacksaw blade will remove the protrusion and allow the inner shaft to rotate a full 360 degrees. This will allow the filter to tune independently of the oscillator.

The converter, when used as a ¾ meter converter, will have the oscillator working above the signal to be received. The ¾ meter band will be found around channels 34 thru 38 when turned in on Channel 6 of a conventional VHF TV set. For voice reception, an existing communications receiver may also be used. For a 6 meter receiver (50 to 54 mc input) the ¾ meter band will be found on the Gavin converter around channels 26 thru 33. For a two meter receiver this band will be found on channels 28 thru 35.

It should be noted that this conversion does not preclude the use of the converter for regular UHF TV reception. The only problem will be that the filter will have to be adjusted over a greater range then would have been necessary before removal of the filter shaft stops.

Swan Transceiver Modifications

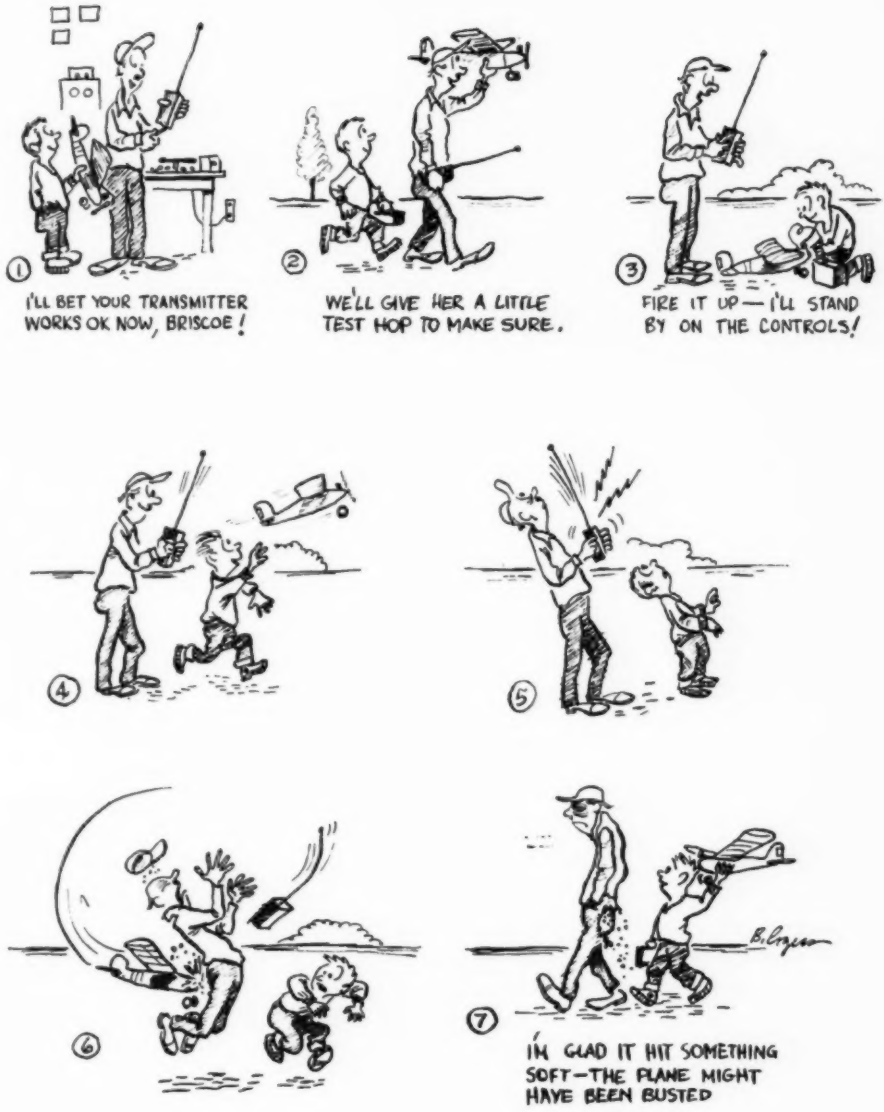
AGC amplifier and AF/RF gain control

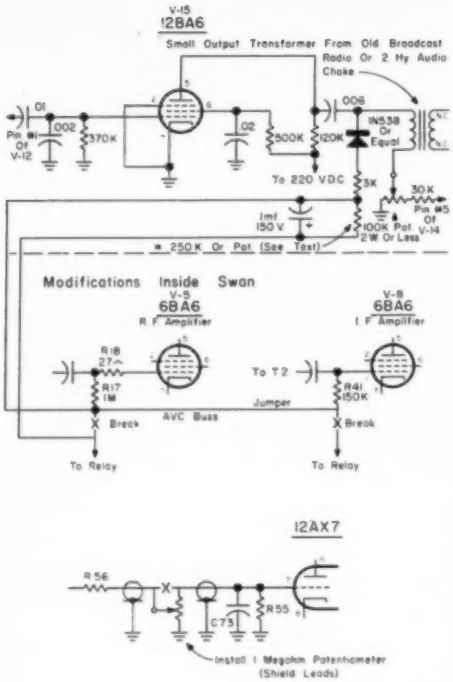
B. C. Alexander W5TOC
2838 Gross Rd.
Dallas 28, Texas

After trying several AGC circuits in the Swan SW-175 transceiver and finding them all lacking in one way or another, I decided to try my own hand at designing one. The prime reason being that in the Dallas–Ft. Worth area we have about 50 mobiles all using the same freq of 3915 kc and some of them will be right on your bumper, and others as much as fifty or so miles away. Needless to say, some knob twisting had to be done if I was going to keep the XYL and the speaker both in the gas buggy. The requirements for such an AGC are simplicity of design, cost, and last but not least, an ability to control the amount of audio coming out of the old squaker with only a few micro-volts of rf signal up to the "Wise Guy," who sneaks up on your bumper and hollars "Hello dawh, you copy–??"

The following schematic is offered as a cure to this rear bumper joker. It is a revised circuit, which was first published in 73, April 1962 by K6SHC which worked reasonably well except that its range of control was limited due to not having a separate rf gain control beyond the take off point of the rectifier which furnishes negative voltage back to the rf and if amplifiers. When an extra strong signal was received that necessitated turning down the volume control, the AGC circuit was then fed less voltage which resulted in less AGC action on the front end, and you were consequently right back where you started.

This difficulty can be overcome by the installation of an audio gain in the K6SHC circuit and taking off the AGC voltage ahead of the audio gain control. The low level voltage


1
I'LL BET YOUR TRANSMITTER WORKS OK NOW, BRISCOE!
2
WE'LL GIVE HER A LITTLE TEST HOP TO MAKE SURE.
3
FIRE IT UP — I'LL STAND BY ON THE CONTROLS!
4
5
6
7
I'M GLAD IT HIT SOMETHING SOFT — THE PLANE MIGHT HAVE BEEN BUSTED



present at the plate of either the product detector of the 1st audio stage, necessitates construction of an AGC amplifier to get the necessary voltage for proper AGC bias.

The construction of the circuit is not critical, and choice of tubes which will work satisfactorily is wide; a 12BA6 was used solely because one was handy. The tube was mounted on an "L" bracket horizontally underneath the chassis in the vacant area just behind the lower half of the disc dial next to the front panel, with the pins of the tube toward the present volume control. This position places the connections to the base of the tube next to a terminal strip where 220 volts is available (hot side of R-57 100k plate resistor of V-12). The mounting of parts underneath is quite easy due to the unused space in the Swan. The AGC level adjustment pot may be mounted on the back panel along side the power plug. A one meg. pot may be substituted for the (*) 250k fixed (Decay time) resistor, which is across the 1 mmfd capacitor. This would serve as an adjustable fast or slow AGC control. This would be mounted on the back panel with the bias and gating control. However, if a 1 meg pot is used instead of the fixed 250k resistor for an adjustable AGC decay, then a 40k ½ watt resistor should be placed in series with the pot to provide a minimum resistance across the capacitor.

Remove the present volume control and replace with a dual shaft 10k/1 meg pot. The knob which is now on the volume control may be salvaged by drilling a hole on thru the knob and using it as the back knob of rf control. The 10k portion of the pot will be hooked back into the circuit exactly as the original single 10k which was taken out. The 1 meg portion of the new pot will then be connected in the grid circuit of the 1st audio stage as per schematic. The spare terminal on the terminal strip just in front of the power plug may be used as the AGC buss, which the end of R-17 will reach. A jumper can be run across to the spare pin on the 6V6 (Pin #1) which will serve as a terminal for the AGC buss line and R-41 (grid of the 2nd if amp V-8).

The only adjustment of the circuit after completion is the setting of the gating pot and the adjustment of the desired delay time. The latter is naturally by choice of the operator. The setting of the gating pot may be accomplished by putting a volt meter across the one mmfd capacitor, turning the transceiver on, and turning it to an unused frequency (Har-de har-har-har) and with the rf gain wide open adjusting the gating pot to a point where the background noise just begins to furnish negative voltage into the AGC buss line. This will be around ½ of a volt, depending upon the amount of noise and band conditions, etc.

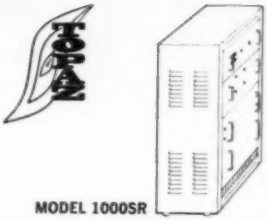
Heat up the solderin' iron pordner, let's put a quite-etis to these rear bumper Jokers, TEXAS STYLE—!!!

. . . W5TOC

Parts List

All resistors are ½ watt and all capacitors are 450 volt disc ceramic except the 1 mfd. which is an electrolytic 150 volt.

1—12BA6
1—7 pin tube socket
1—"L" bracket
2—Self taping screws
1—12 inch piece of shielded hook up wire (Single Condr.)
1—.01 Capacitor
1—.02 Capacitor
1—.002 Capacitor
1—.006 Capacitor
1—1 MFD. (Electrolytic)
1—1N538 Diode (Or Equiv.)
1—2 hy. audio Choke (Smallest Current rating available) or Output transformer from old BC radio.
1—2 watt 100K pot
1—Dual 10K/1 meg. pot (Dual shaft)
1—1meg pot (see text) or one 250K ½ watt fixed resistor.
1—30K resistor
1—3K resistor
1—120K resistor
1—500K resistor
1—350K resistor



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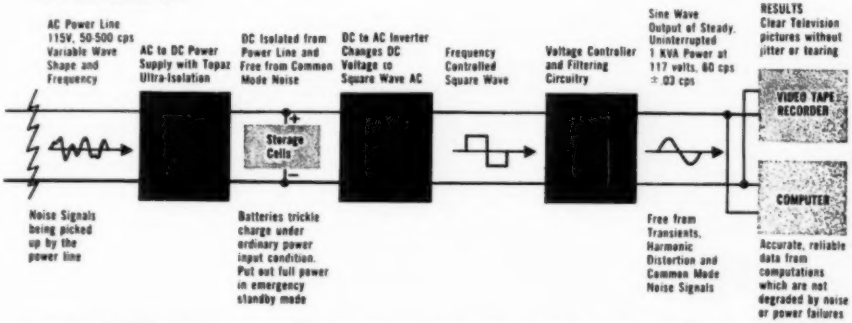
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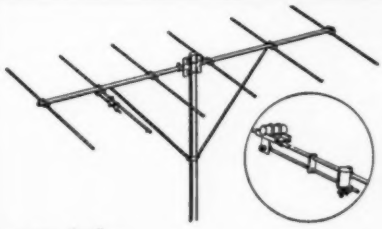

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A Medium Power Mobile Rig

In the past several years, two or three articles have explained how to convert specific items of CB (ugh!) equipment for ham-band use. But none, at least so far as the writer knows, have shed any light on how to boost the power levels up to usable amounts for ham communication!

Having converted one of these little transceivers to roar forth 60 watts of well-modulated rf on 10 meters, while still retaining the receiver unaltered, I thought the technique might be of interest to some of the rest of the gang who have acquired such equipment one way or another.

Basically, the conversion consists of adding an outboard final-amplifier stage built around a pair of TV horizontal output tubes, while retaining the built-in T-R switching of the transceiver and providing some way to modulate the heftier carrier which results. The unit described here fills the bill nicely.

But I might as well start by warning that the details won't apply to all CB units. The one converted here was a Kaar 327; any other transceiver having the following features will also work: 1) Relay switching from transmit to receive, *at the antenna connector*. 2) Transformer mudulation. 3) Separate rf amplifier and final tank coils.

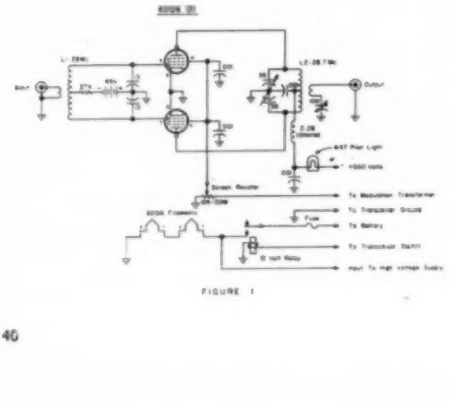

FIGURE 1

Converting The CB Unit

Actual conversion to 10 meters from the 27 mc band won't be described in detail, since it will depend largely on the circuit of the particular rig. The Kaar uses 13.5 mc rocks, doubling, and requires 14 mc crystals to reach the ham band. The receiver is moved over by judicious adjustment of its oscillator trimmer. Various trasmitter coils were pruned slightly for best measured output at 28.7 mc.

After the transceiver is operating properly in the 10 meter band, find a spot on the back panel where you can mount two coax connectors and a 3-contact female socket. These will provide connection and control for the outboard amplifier.

After mounting the connectors, break the lead from the transmitter final output to the T-R relay. Run a new lead from the output circuit to one of the new coax connectors, and a second lead from the other coax connector back to the T-R relay, so that a jumper between the two coax connectors will restore the original circuit.

Then run a lead from the final-amplifier-plate side of the modulation transformer to one contact of the 3 contact socket, and a second lead from the controlled side of the on-off switch to another contact of the socket. The third contact goes to ground.

Make up a jumper for the coax connectors so you can use the unit at low power. This completes the modification of the unit.

The Outboard Amplifier

We begin this section with a description of the outboard unit, so you'll know what's up as we get into construction details.

The outboard amplifier consists of a pair of 6DQ6-G horizontal output tubes, operated push-pull, and screen-modulated. Before you scream about the screen modulation, however, remember that the *driver* is also modulated and the result is consistantly good modulation with greater overall efficiency than is usually thought possible. To get 60 watts out, we put only 100 watts in.

The modulated rf from the transceiver is applied to the grids of the 6DQ6's through a fixed-tuned circuit, resonated slightly lower than operating frequency to avoid the need for neutralization.

The modulated high-voltage also sampled from the transceiver is applied to a variable resistor in the outboard final, and the tap on this resistor feeds the screens. Original plan was to bypass audio from the top of the resistor to the screens, but 100 percent modulation was achieved without this proving necessary so the capacitor was left out.

The final takes its filament and high-voltage from a separate supply. Originally a transistorized supply was used, but heat proved too much for the semiconductors so a PE-101 was substituted. Both the filaments and the HV supply are controlled by a relay, which is actuated by the current taken off from the controlled side of the transceiver switch (lead No. 2 in the connecting cable).

Output from the final is returned to the transceiver through coax, where it is routed to the T-R relay and thence to the antenna.

Since power is applied to the new final at all times when the transceiver is on, 45 volts of fixed bias from batteries is applied to the grids. This holds plate current almost totally cutoff in the absence of drive, and makes T-R switching a simple affair indeed.

Now let's get to some of the details.

The original outboard was built into a 7x13x2 inch chassis, but a 7x9x2 would suffice if you don't plan to include a transistor HV supply. A single Seezak side rail (No. 62) was mounted across the 7-inch dimension inside, with holes punched for the two ceramic tube sockets. This provides almost complete shielding between grid and plate circuits.

The grid circuit consists of a length of Miniductor or Air-Dux supported between the grid pins; the sockets were mounted so that the grid-pin spacing was approximately correct. In the original, this tank circuit was

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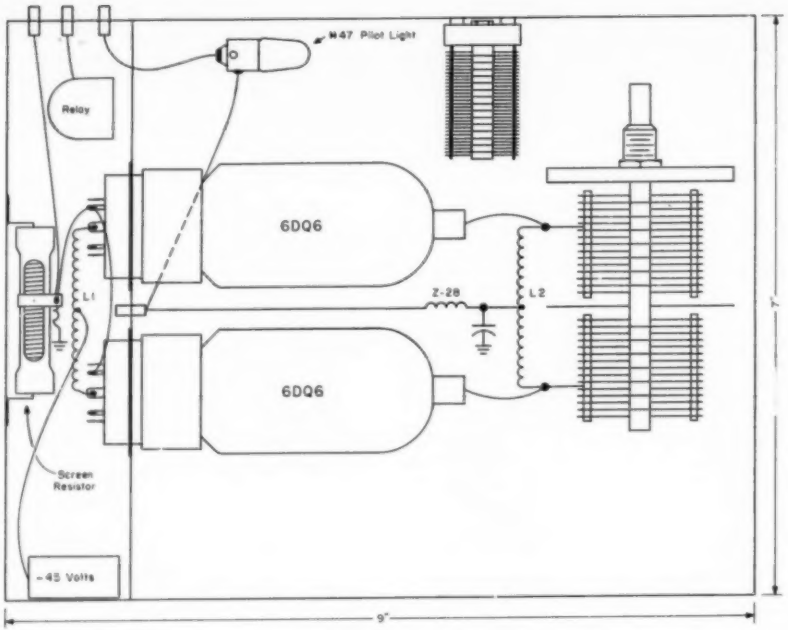

FIGURE 2

Sketch looking down into amplifier, cover removed showing changes required to CB rig.

trimmed to frequency with small ceramic capacitors; it might be more convenient to use a small butterfly variable, thus allowing field adjustment.

The two screen pins are individually bypassed to the cathodes and are in parallel for dc; the common lead goes to the slider of the variable power resistor, which mounts lengthwise across the inside end of the chassis. The two bias batteries are mounted nearby, as far as possible from the resistor however to avoid heat problems.

Cathodes ground directly to the Seezak rail, via solder lugs and self-tapping screws.

A 1/4-inch standoff insulator mounts directly between the two tubes and slightly nearer the chassis; this is the B-plus tie point and is bypassed with a HV ceramic. A lead runs from this to a socket for a No. 47 pilot bulb which serves as a combination tune-up meter and fuse. The hot wire from the power supply or dynamotor comes to the other terminal of the bulb socket.

The plate circuit is located at the far end of the chassis from the Seezak plate. It consists of a split-stator variable (picked for size and plate spacing, from surplus—several models of current manufacture are suitable) and a plate tank coil wound from No. 12 wire to resonate. Flexible leads made from shield stripped from RG-58 connect the ends of the coil to plate caps; parasitic suppressors may or may not be necessary. If posible, leave them off as they reduce efficiency horribly.

An Ohmite Z-28 choke connects the B-plus tie-point on the tube-socket plate to the center-tap of the plate tank coil. The center-tap should also be bypassed to ground as shown on the schematic; another standoff insulator comes in handy here.

Loading is adjusted by a series capacitor in the conventional manner. Coax from both input and output loops runs back to the transceiver. If this coax is properly grounded both at its origin and at the point where it leaves the chassis "case," you should have no trouble with feedback caused by proximity of the leads.

A cover plate to completely enclose rf within the chassis is a necessity, however, and a series of ventilating holes should be drilled in both plate and chassis so as to let air flow past the 6DQ6's. Failure to do this at first resulted in a badly blistered rf choke, as well as a melted-out solder joint or two!

Test & Tune-Up

After checking all the wiring, smoke-test the

unit. If nothing burns, you're ready for initial tune-up.

Start with the slider on the screen resistor set at its ground end; this will hold current in the final almost to zero during the initial stages of test.

Plug in the 3-contact connecting cable but leave the jumper on the transceiver, and recheck its tuning to make sure the addition of the resistor on the modulation transformer hasn't shifted the point of proper tuning.

Next, make all connections. Using a VTVM with isolating resistor, measure dc voltage at either grid pin of the 6DQ6's. It should be appreciably greater than the standing bias voltage; if not, check the grid circuit to find out why.

Assuming you have proper grid drive, the next step is to attempt to resonate the plate tank. Use a wattmeter in the antenna line for this, and be sure the cover plate is on the amplifier (parasitics are almost certain if the plate is off). You will probably get about the same power out as with the transceiver operating barefooted at this point. Set the loading control for minimum, retune the plate, and leave it tuned.

Now you're ready to set the carrier level and adjust the modulation. This is best done with a scope, but can also be done by rule-of-thumb and a wattmeter (that's how the original was tuned).

First, turn everything off and short out the B-plus lines for safety. Now move the screen-resistor slider up to about 1/3 of the way from ground. Remove the shorts on the B-plus, and turn on the equipment.

You should now have appreciable current being drawn by the 6DQ6's, and power output should be somewhere betwen 50 and 80 watts. Load for maximum power output; if the tubes start to glow, pause briefly, and move the screen slider closer to ground. The objective at this stage is to get all settings right for an output power reading of 120 watts—but don't hold it for long as this is above all continuous —duty ratings.

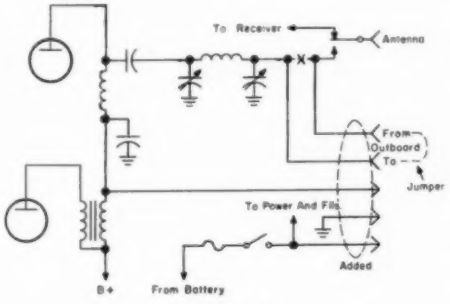

FIGURE 3

Once you get the plate circuit adjusted for 120 watts (or more) lock the loading and plate tuning settings so they won't be moved. Now adjust the screen slider (with power off) so that power output drops to one-half the amount you originally got. Operation at this level gives you 50-percent modulation, with relatively high power. Reducing screen voltage until power output drops to 25 percent of the maximum would give 100 percent modulation, but in practice the 50-percent-modulated 60-watt signal was more readable over a longer range than was the 100-percent-modulated 30 watt signal. In any event, you can take your pick.

From this point, you have only one remaining step. That is to measure input voltage and current to get an input-power reading for your log. Typical values will be 100 watts for the 60 watt output, and 75 watts for the 30 watt output. Then it's up to you. Have fun!

. . . K5JKX

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Transmission Line Tripe and Trivia

I have a strong dislike for experts! That is, the self admitted brand! Any genuine gold-plated expert is generally much too intelligent a character to make any claims of technical superiority. Personally, I prefer to think of myself as a bungler! This statement gives me a great edge over the "experts," as any goof-up I make is covered by my own admission to being a bungler. These preceding statements are made to permit me to vent my rage on the genuine bunglers (alias the Experts.)

It all started several years ago when I became Editor of a Radio Club newspaper. The Club is a moderately large club with a membership of over several hundred. The paper is read locally by dozens of Amateurs who are engineers by profession and education. Needless to say, technical errors bring down a verbal barrage of reproach and ridicule, therefore we try to get several opinions prior to committing ourselves in print. Now in the capacity as Editor, I scan the various Amateur magazines, general electronics magazines, electronic hobbyist magazines and about 30 different Radio Club papers received on an exchange basis. In recent months, there seems to have been a more than usual interest in transmission lines and this is what triggered me off. Some of the statements regarding transmission line phenomena and application border on the ridiculous. The sad part is that newcomers to the hobby read these erroneous statments which are presented in very simple terms and, the weight to their terms being relatively simple and easy to read, accept them at face value.

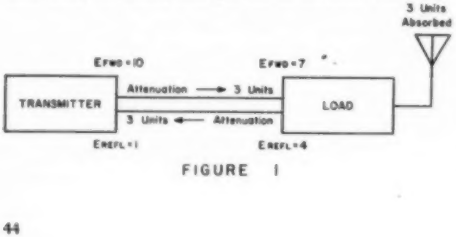

FIGURE 1

Some of them are real corkers! Some are heard again and again over the years. Due to lack of knowledge of the laws of libel, I will omit the actual names of who wrote them and where they were printed. If you have read them in the past, you will possibly recall them and you can check them again for reference.

First, and thank heavens this *was not* in an Amateur publication! The article in question went on at length to tear away the mystery of coaxial lines characteristics impedance by stating: "to measure the characteristic impedance of a line, connect an ohmmeter between the center conductor and the braid and *read the meter closely*". This statement wiped out years of work and reams of transmission line theory. The big calamity is that the author of the article neglected to mention just what kind of super meter he used!

Secondly, the half truth. I quote: "If you have a 52 ohm load and a transmitter whose output circuit is designed to work best into a 52 ohm load, but you have only 300 ohm twin lead available, then cut the 300 ohm feedline to exactly one half wavelength. By doing this, the 52 ohms at the load end will be repeated at the input end and the transmitter's output circuit will be matched. (So far so good, but he was not content and proceeded to really befuddle the issue.) He then stated, "Since the transmitter's output circuit is matched, the SWR will be 1:1!"

Zilch! Dear "expert" has evidently not become acquainted with basic theory which shows that the load is the prime determinant of the SWR. If a 300 ohm line were terminated in 52 ohms, we would divide 300 by 52 and find our SWR was approximately 5.3:1 at the load. No matter how he shortens, lengthens, or decorates his line, the SWR on it will not be 1:1. And while we are thinking in this line, most texts agree that the load is the prime determinant of the SWR with little mention made

that *any* discontinuity in the line will be a contributing factor. In particular: poorly assembled coaxial connectors, damaged coaxial line, sharp bends and cables strung so they collect moisture (which, if it invades the inner workings of the cable, can change its characteristic impedance, and upset the carefully adjusted matching system.) Third. The party responsible for the previous statement also blandly states " that the place to measure SWR is at the generator". Granted that it is usually more convenient to measure it at the transmitter end, as most people do not like to be troubled sticking their heads out the window and reading a meter that is possibly 40 feet up in the air. The SWR at the transmitter can be very deceiving unless properly evaluated. For example, take 300 or 400 feet of cable (RG8/AU) and stretch it out across a field. Feed 50 watts of 2 meter energy into it. At the far end, leave it wide open or drive a nail into it, (take your choice). With it open or shortened, you will have an infinite SWR at the load end. However back at the transmitter, you will find you have a very tolerable SWR. This will bear out the statement that the SWR at the load is always greater than at the generator. So if you don't like your SWR at the transmitter and you also don't care how much you lose in the cable, keep adding line to your heart's content. Your SWR will go down, also your signal! Here is a little proof by pictorial analogy! VSWR is defined as the ratio of the voltage maximum to the voltage minimum on the line. E maximum is defined at the incident voltage (E forward) plus the Reflected Voltage (E reflected). E minimum is the E fwd minus the E refl.

Therefore VSWR equals

$$\frac{E_{MAX}}{E_{MIN}} = \frac{E_{FWD} + E_{REFL.}}{E_{FWD} - E_{REFL.}}$$

Fig. 1 shows roughly how the incident or forward voltage is attenuated in travelling from the transmitter to the load and vice versa for the Reflected energy. The figures used are an approximation to avoid the use of formulae involving losses up and down a line.

In Figure 1, if we have 10 units of forward voltage and the attenuation of the line consumes 3 units, then we have 7 units of E fwd arriving at the load. If the load is a poor match and absorbs only 3 units, then 4 units are rejected. On the return trip, the 4 units are attenuated and drop to a magnitude of 1 unit on arrival at the transmitter. Applying these figures to the formula, we arrive at the following results.

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$$SWR = \frac{Emax}{Emin} = \frac{10+1}{10-1} = \frac{11}{9} = 1.2{:}1$$

Transmitter end

$$SWR = \frac{Emax}{Emin} = \frac{7+4}{7-4} = \frac{11}{3} = 3.6{:}1$$

Load end

What our friend might have done was to have qualified his statement and said that at frequencies below 30 mc/s where short runs of cable were involved, since attenuation figures are relatively small at the lower frequencies, then for most practical purposes, the SWR at the transmitter would be approximately that at the load end. BUT not in the VHF range Brother!

And still another faux pas. Why do characters persist in talking about pruning the line length to lower SWR? This has always been a tough one to combat because an unenlightened "line pruner" can quote circumstances where better transmitter loading occurred after the pruning." No argument on this part of it, since he merely found a length of line and a cable input impedance which was a little more to the liking of the transmitter's output circuit. But he certainly was not watching his SWR bridge! With the advent of inexpensive SWT Bridges in the past few years, the elimination of this particular irritation may soon be at hand.

And another. In one article which was very well written, the author made several fine contributions to the art and then fluffed on a basic point. Said he "any amateur knows that a transmission terminated in its own characteristic impedance will reflect that impedance at 180 degree (half-wavelengths) intervals." Bravo! But how about the points in between? The beauty of terminating a line in its own characteristic impedance is that at *any* point *any* distance from the load on the line, the impedance seen will be purely resistive and equal to the characteristic impedance of the line.

Classroom trickery! For the past several years I have held a position where the teaching of transmission lines was among my assignments. To demonstrate pointedly to my classes (which incidentally often include graduate engineers) I toss a statement on a True or False basis. "A transmission line repeats itself every 180 degrees" and then wait for the storm when I point out that the statement is False. The basis of my trick statement is a concept used in the analysis of a theoretical line. That concept states " A transmission line will repeat itself impedance wise every 180 degrees *if the line is lossless*". What is it that does not repeat? Well how about the phase of the voltage? There will be a 180 degree reversal. How about the SWR on a practical line? Since the SWR is greater at the load, then as you move away from the load the SWR will decrease.

Tripe and Trivia! Well maybe so but it seems to me that it is almost a duty to meet some of the tripe head on and, trivial or not, do our best to see that some corrective action is taken.

. . . W5EUL

Modularization

Jim Kyle K5JKX
1236 N. E. 44th St.
Oklahoma City, Okla.

In the far-out reaches of advanced military-type electronics research, one of the "magic phrazes" is the simple word "modular".

In case you missed the excellent discussion of modules and their uses in ham radio which W5WGF authorized in the February 1963 issue (page 40), we'll run through again just what a modular design consists of:

You're probably familiar with a block diagram as opposed to a schematic. Now if each "block" on the diagram happened to be built on a different chassis, and the chassis were so arranged mechanically that they could be easily interconnected, you would have a collection of modules. Each module has its own purpose, and they can be interconnected in almost any way you can imagine.

The earlier article on ham use of modules explained in some detail how to put large chunks of circuitry on compact subassemblies

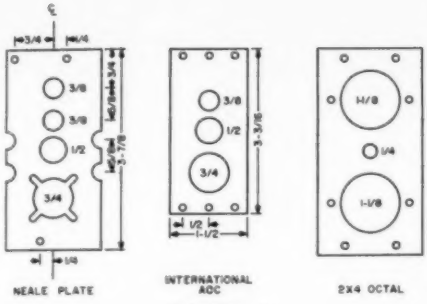


FIGURE 1

Module plates

and interconnect several of these subassemblies into a complete functional unit. For example, one module consisted of an oscillator-buffer providing output at any frequency from 24 to 72 mc; a second module was a 48-54 mc amplifier driven by the first; while a third was a 48-to-144-mc tripler to be driven by the second. This approach to modules is an excellent one.

But for the compleat experimenter, a more rigorous approach to modularization might be in order. This approach is more like the military version, where each module has its simplest possible form.

An rf amplifier module, for instance, might consist merely of the tube and its associated biasing resistors and bypass capacitors. The coils are on two other modules; in this fashion, the rf amplifier module can be used from 100 kc to 100 mc with no modifications!

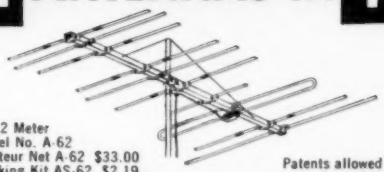
While this approach has not been pushed to any extent in the ham field, at least one firm is currently marketing such modules (International Crystal's "Add On Circuits"). And they're not difficult for any experimenter to put together for himself.

Fig. 1 shows three possible forms such modules can take so far as their chassis plates are concerned; chassis dimensions are one of the key points when working with modules, since each module must be able to fit in with every other module in the collection.

The "Neale Plate" in Fig. 1 is a design originated in England; the ¾-inch hole takes a 9-pin socket or a 7-pin wafer socket having 1-5/16" mounting holes, the ⅜ inch holes are for pots or coil forms, and the ½ inch hole is for a toggle switch.

The "Int.AOC" plate is an adaptation of the International plate; outside dimensions are identical with the commercial modules, while the holes allow mounting of the same components which fit the Neale Plate.

2 ANTENNAS IN 1



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Finally, the "2x4 Octal"plate is designed for use solely with Octal sockets; to use 7 or 9 pin sockets, you could either substitute smaller holes, or drill through some 1-¾ inch hole plugs which could then be put in the holes on the plate.

If metalwork doesn't appeal to you but you like the thought of modularizing most of the more common block-diagram circuits, you might investigate See-Zak "Special Electronic Parts" which are produced by Rimak Electronics Inc., 10929 Vanowen Street, North Hollywood, Calif. Most of us are familiar with their expandable chassis—but they also produce a line of breadboard modules, including a "Started Kit" containing samples of all their breadboard module plates and priced at $16.98. Some of the plates in their line include meter mounting plates for meters as large as 3-inch size, relay-rack mounting adapters, and insulated terminal-strip plates.

To put together a set of modular "building blocks", one of the first steps would be to decide whether you prefer to start with rf or audio. If audio is chosen, a couple of low-level amplifier plates, one medium-level driver, an assortment of phase inverters, and several power-amplifiers stages (up to say 50 watts push-pull) will provide you enough experimental material to breadboard modulators and/or receiver audio from now on.

If rf is chosen, a half-dozen standard rf/if amplifiers, less all frequency-determining components (see ARRL handbooks for circuit) provide a good starting point. Two or three mixers, a handful of detectors, a batch of coupling-coil plates, and an oscillator or two complete the lineup for breadboarding receivers.

For transmitters, you may find it more convenient to include the plate coil on the module plate; to have a good collection of modules in this field, at least one oscillator and three or four frequency-multiplying plates should be available. Final plates in power levels ranging 5 to 150 watts are also advisable. Differential keyers, VOX circuitry, and similar accessories can be modularized as desired and added to the collection.

If you need circuit ideas to help fill these module plates, go through the back issues of 73 and study the Big Technical Articles which have appeared more or less regularly since the second issue of the magazine; most of these circuits are ideally suited to the module approach, though a few are more integrated.

And when you have your module collection going full blast, and work up some interesting combinations, drop a note to Wayne; who knows, your modularization might pay off!

. . .K5JKX

Transceiving High Level Mixer

Wilbur Notbohm W2KPC
Secaucus, New Jersey

Stuck on one band? Or three? No need to be, as the author easily found out. The transceiving hi-level mixer described is presently used with a three band Swan to get on ten, for local rag chewing. It was also tried on 15 and worked equally well. Future plans call for band switching this unit to cover 10 and 15, and another for 6 and 2. No changes were made in the Swan. The power supply for the Swan is home brewed, and when used with this mixer, the high voltage for the 6DG5 is dropped to 400 volts According to the manufacturer it could be as low as 260 volts. Reduced input to the final is desirable. With 400 volts on the final and with carrier (in tune position), it is loaded to 150 ma, about 60 watts pep. The audio gain is set about position 4. Most one and three band transceivers can be loaded to a reduced input, and with reduced audio gain drive this mixer. A pad might be needed for additional attention with some transceivers. If your transceiver has AM output like the Swan, this mode of modulation was tried and it works. It is not expected that it will be duplicated per se but that it will stimulate some of you to get out the old pencil and paper and work up other combinations. A better choice of tubes and components might be warranted, but my source of supply was the junk pile.

Let's take a look at the circuit. One-half of a 12AT7 is used as a crystal oscillator. Its plate

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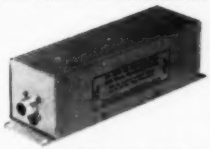

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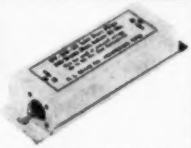

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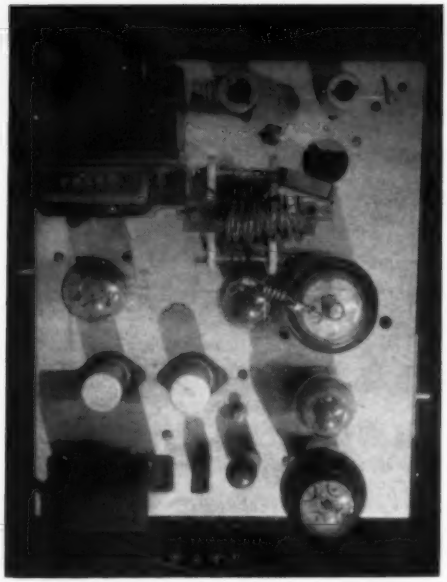
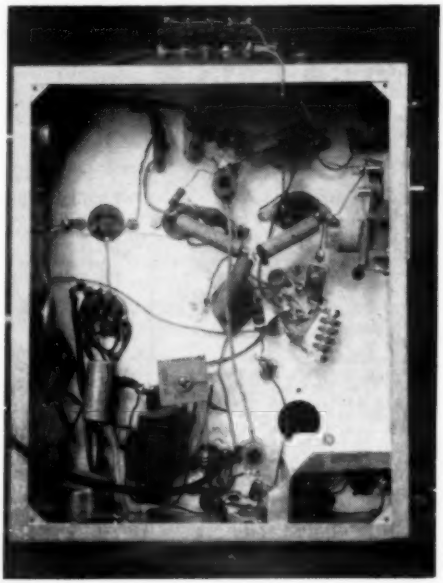


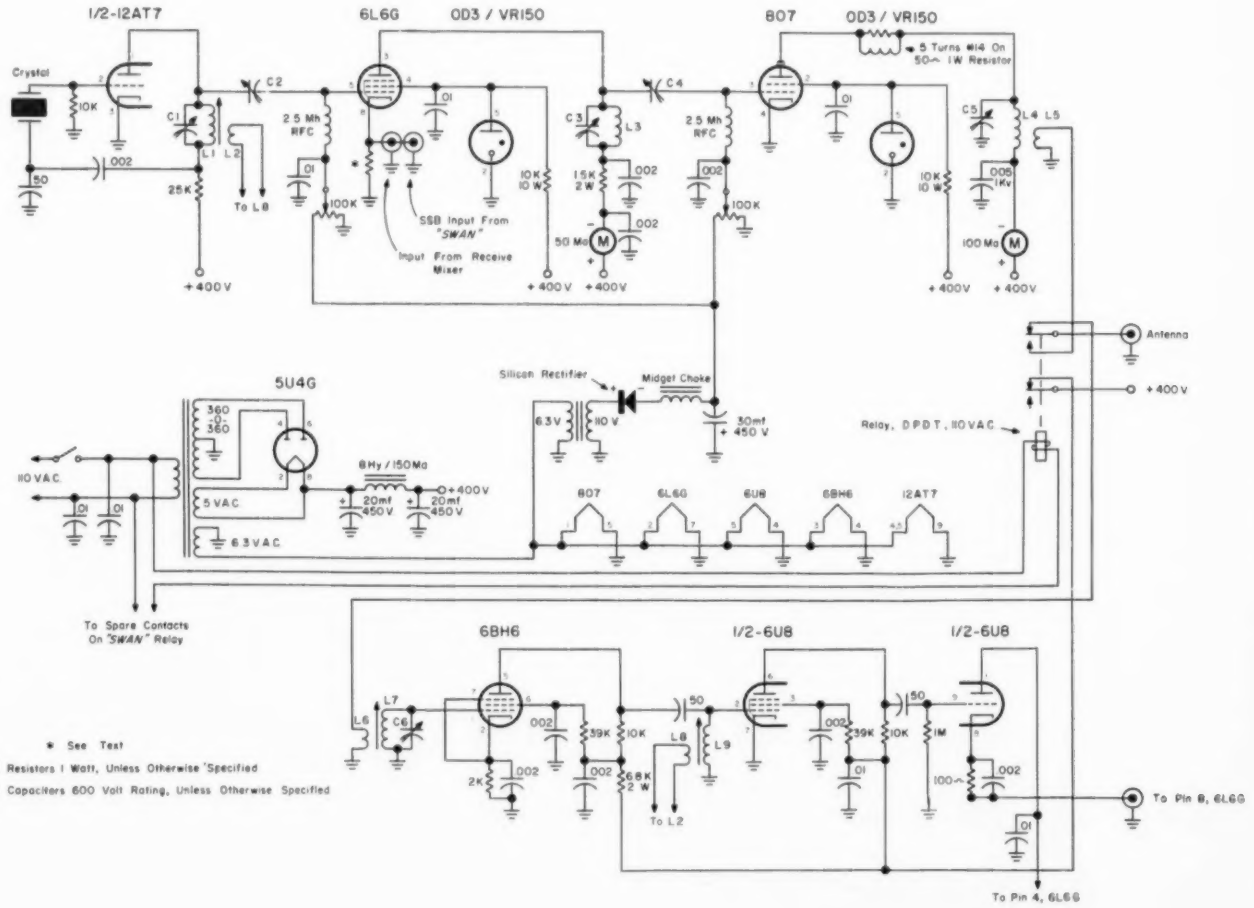
circuit is tuned to 21,450 kc, the third harmonic of the crystal frequency, which is 7150 kc. The output of the oscillator is capacity coupled to the grid of the 6L6G used as the transmitting mixer. 40 meter sideband output from the Swan is fed to the cathode of the 6L6G. On forty, the Swan has a range of 250 kc, tuning from 7050 to 7300 kc. These frequencies, when added to 21,450 kc in the mixer, give 10 meter output in its plate circuit. The plate circuit therefore tunes from 28,500 to 28,750 kc, in which range most 10 meter sideband activity takes place. A change in crystal frequency could extend the useful range. The 10 meter output of the mixer drives an 807 tube as a class AB 1 linear 12 to 15 watts pep. Increased output could be had by raising the screen voltage on the 807 which at present is 150 volts regulated.

When receiving, 10 meter input from the antenna is amplified by the 6BH6 tube. The amplified signal is then fed to the grid of the pentode section of the 6U8 tube, which acts as the receiving mixer. 21,450 kc output from the oscillator is fed to this same grid. Link coupling is used with a pair of twisted leads as the transmission line. The difference between 21,450 kc and the 10 meter signal will produce a 40 meter signal in the plate circuit of the 6U8 pentode mixer. The received signal will now be on the same frequency that the Swan is putting out, true transceive. Output of the pentode receiving mixer is fed to the grid of the triode section of the 6U8 tube, which is used as a cathode follower. A cathode follower was used to obtain a better match of impedance between the output of the receiving mixer and the input to the Swan, a high to low impedance combination. A tuned circuit with link coupling would give higher output—but as I will explain later, would limit the usefulness of the unit. Output from the cathode follower is coupled by a short piece of co-ax to the cathode of the transmitting mixer. This means of course that it is connected to the input of the Swan. The output of the receiving mixer and the input to the transmitting mixer are one and the same point. No switching is needed. Switching is needed to transfer the antenna from the 6BH6 input to the 807 output when transmitting and to disconnect B+ from the 6BH6 and 6U8 tubes when transmitting.

Two important points about this circuit make it especially adaptable to all transceivers. 1) No tuned circuit is used between it and the driving unit on transmit. 2) The output of the receiving mixer is also untuned. This means that single band transceivers with output on 80, 40, or 20 can be used if the proper crystal frequency or harmonic of it is chosen so that the sum or difference falls in the new band desired. However, with a 20 meter unit to get on 10, the difference frequency should be used. Remember when the sum frequency is used the sideband is unchanged; when the difference frequency is used, the sideband is inverted.

A 10 x 12 x 3 aluminum chassis was used

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.002
50
25K
C1
L1 L2
To L8
C2
2.5 Mh RFC
.01
100K
SSB Input From "SWAN"
Input From Receive Mixer
10K 10W
C3
L3
15K 2W
.002
50 Ma
+400V
C4
100K
100 Ma
C5
L4 L5
.005 1Kv
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1/2-6U8
L6
L7
C6
39K
68K 2W
L8
L9
50
2K
1M
100Ω
To L2
To Pin 8, 6L6G
To Pin 4, 6L6G
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for construction, simply because it was handy. A study of the photos will show you that it could be easily compacted. The layout isn't critical; previous holes in the chassis influenced the positioning of components, and no particular bugs developed. Shielding of the receiving rf amplifier circuit is necessary. A partition and bottom cover were put around it. A piece of co-ax or shielded cable is necessary betwen the cathode follower output and pin 8 of the 6L6G. Make the exposed portion of the leads as short as possible. The 50 ohm resistor in the cathode circuit of the 6L6G mixer is the load into which the transceiver develops its output. This resistor must be non-inductive and capable of dissipating the output of the transceiver used. A study of the photos shows that the resistor used was outboard. It is made up of 40, 2000 ohm 2 watt resistors in parallel, left-over from some previous experiment. As the mixer is operated here, no heating of these resistors is evident. If an outboard resistor is used, it is recommended that it and the leads used be shielded. Remember this is the output and input point of the transceiver. A relay isn't shown in the photos because it is external at this QTH. It should be located near the 807 output tank circuit so that one end of L5 can be connected to it. The co-ax fitting for the antenna should be close to the relay. A piece of co-ax should be used between L6 and the relay. Locate the co-ax fitting for transceiver input as near to pin 8 of the 6L6G as possible.

Immediately after power is applied adjust the 807 bias pot so that its plate current is 15 ma. Remove the crystal and adjust the 6L6G bias pot so that its plate current is zero. Reinsert the crystal. Set C1 near maximum capacity. Adjust L1 and C2 for maximum 6L6G plate current. It may be necessary to readjust C1. Check with a wavemeter to see that the oscillator plate circuit is tuned to 21,450 kc.

Now feed 7050 kc sideband input from the transceiver. The Swan is adjusted to 60 watts pep input. (400 volts 150 ma). It develops its output in the 50 ohm resistor in the 6L6G cathode circuit. This is done with the Swan in the tune position. Adjust C3 for maximum 807 plate current (about 40 ma). Adjust C4 for maximum 807 plate current. It may be necessary to readjust C3. Check with a wavemeter to see that the 6L6G plate circuit is tuned to 28,500 kc. C3 should be near its minimum capacity. Adjust C5 for minimum 807 plate current. C5 should be near its minimum capacity. Connect the antenna and readjust C5 for minimum 807 plate current about 50 ma.

Turn the Swan to the transmit position (no carrier). Readjust the bias pots so that the 6L6G plate current is 10 ma, and so that the 807 plate current is 15 ma. Set the audio gain to position 4, push to talk, and speak into the mike. The final plate current should kick up to at least 40 ma. The 6L6G plate current will barely flicker. You are on the air.

When the push to talk button is released, the receiving mixer is functioning. If you have a signal generator set it to 28,500 kc and peak L7 with C6 set about its middle value; also peak L9. Without a signal generator it is possible to peak these with noise pick-up and then readjust on a weak signal. The received frequency will be on the same frequency as your transmitted signal.

Many local contacts have been made with this mixer and Swan combination. The reports and comments made very favorable. The 10 meter results proved the signal quality and stability were equal to that on the lower bands. While aligning the receiving section, several Florida and Texas stations were heard. Most tests and checks were made by prearranged schedules. I wish to thank my good friend Joe K2IQZ for his time spent listening and testing with me. Tired of QRM? Get on ten, it does open up but you have to be on to get it. It's an ideal band for local rag chewing. Try this mixer, don't underrate its possibilities, especially with a good antenna. Let's hear some more of you fellows on ten, USB *and* LSB . . .

. . . W2KPC

Parts

L1—15 T #20 E close wound on National XR-50 slug tuned form
L2—1 T hook-up wire, near old end of L1
L3—8½ T #14 dcc close wound on ¼ dia. polystyrene
L4—10 T #14 E 1½ L, air core, ⅞ id.
L5—2 T #14 plastic covered, ⅞ id., insert between L4
L6—2 T #20 plastic covered over cold end of L7
L7—19 T #24 E close wound ⅜ dia. slug tuned ctc ls5
L8—17 T #24 E close wound ⅜ dia. slug tuned ctc ls5
L9—1 7 hook-up wire near cold end of L8
C1, C2, C6—3-30 mica trimmer
C3—35mmfd max. var. cap. double spaced
C5—35 mmf max. var. .003 spacing
S. R.—Selenium Rectifier 75 ma
T1—T. V. Transformer 200 ma
T2—6.3 volt 1 amp. fil. trans.

An Electronic Filter Capacitor

or, What won't they trasistorize next?

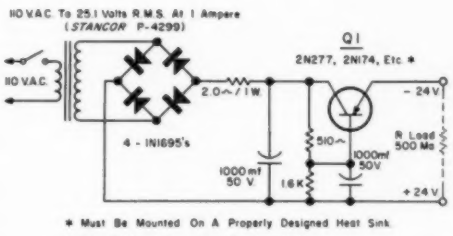
Fred Haines W2RWJ

When I first heard about it, I thought it was one of those April Fool jokes. When I saw it demonstrated in the lab, I changed my mind in a hurry; it really works!

A survey of the power supply section of a handbook will reveal that a power supply is easier to filter if the load current to be drawn is small. As the load current increases, the size of the filter capacitors must increase if the ripple is to remain the same. It would be nice indeed if a new circuit could be devised that would be able to magnify the effect of a small capacitor and make it act the same as a larger one. For one thing, capacitors of the electrolicorice type are expensive, and for another, they are rather large.

The circuit to be described here does just what we have been discussing, and has been called a "capacitor multiplier". It works so well that usually even the filter choke may be thrown out, and in high current drain supplies too.

In the circuit diagram, notice that the transistor is conected from the output of a conventional silicon rectifier bridge to the load, represented here by a resistor. The transistor base is biased by R1 and R2, connected in a divider across the supply potential. The key here is the 1000 mfd electrolytic C2 from base to the plus side of the supply. This is the capacitor whose value the transistor "multiplies". The multiplication factor is the dc current gain of the transistor, sometimes called the Beta.



A simple formula can be used to describe the action of the circuit. $C_{eff} = C_{actual} \times Beta$, where C_{eff} is the effective filter capacitance across the output of the supply, C_{actual} is the value of capacitor in the transistor base circuit, and Beta as we have mentioned is the dc current gain of the transistor.

The dc current gain of a typical power transistor at say ½ ampere is 50. This means that a 1000 mfd capacitor in the base circuit will provide the same action as a 50,000 mfd filter across the output of the power supply! If you don't think that's much, go to your catalog and price a 50,000 mfd, 50 volt electrolytic. If you buy one, try to find room for it on that crowded chassis.

The supply in the diagram can deliver up to 1 ampere at 24 volts dc output. The R1 shown is for an output of 500 milliamperes. To obtain an output of 1 ampere, change R1 to 200 ohms and change C1 to 2000 or 2500 mfd at 50 volt rating.

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The figures I obtained from this supply in the lab are as follows:

Volts Output Normal	*Current Output*	*Ripple Volts At Full Load*
24	0.5 ampere	1.5 millivolts
24	1.0 ampere	1.0 millivolt

The output voltage can be varied by use of a different transformer and a different transistor bias network. The bias should be such that the transistor has between a volt and 3 volts from collector to emitter at full load. In addition, the bias network must be relatively low inpedance as shown here.

Don't forget that the power transistor must be heat sunk! That is, it must be properly mounted to a metal heat sink plate and properly insulated with a standard mica or anodized aluminum washer. See the article "Let's Regulate" in the March 1963 issue of 73 magazine. The electronic filter can also be used most successfully following a transistorized voltage regulator as described in the article mentioned above. Remember, the circuit described here doesn't regulate, it just multiplies.

I intend to experiment with the circuit to find out if it works with smaller capacitor in supplies requiring less filtering, due to lower current drains. It would be nice to be able to multiply a 1.0 mfd unit to a 50 mfd unit for a transistor power supply capable of delivering say 100 ma or less. The space savings could be dramatic. For low current applications, smaller transistors could be tried too, like the 2N1038 series.

Try this device soon, it's quite amazing, and useful as well.

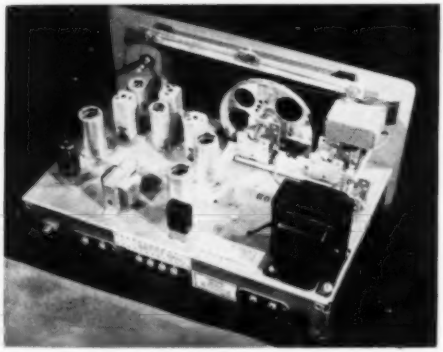
. . . W2RWJ

More Gain for the SX-140

Robert Voss W2HTN
697 West End Ave.
New York 25, N. Y.

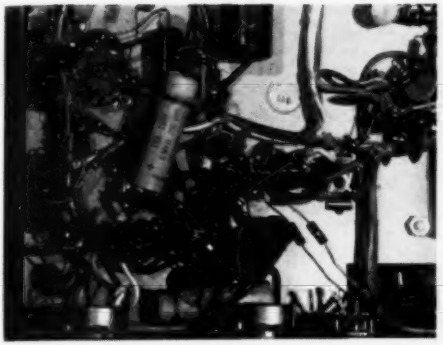
In the relatively short time which has passed since its appearance, the Hallicrafters SX-140 has become a very much respected little receiver. It is, or at least was at the time of its introduction the only receiver in the $100 price range to provide ham-band-only tuning, as well as a tuned rf stage, built-in calibration oscillator, as well as several other convenient features.

After considerable use of the SX-140 I decided to see what I could do about getting a bit more gain before the second detector to give the receiver more hop and make the S-meter more generous. I looked the schematic over for opportunities for improvement, and checked the chassis for room for added components.



I decided that my problem was one of overall gain, not signal to noise ratio. If it had been the latter, curing the problem would have meant redesigning the front end, no easy task. Happily, the rf stage in the SX-140 is a model of efficiency, behaving second only to a cascode dual triode on 6 meters, and as well as anything on the lower bands. Therefore, it seemed obvious that what I needed was another stage of amplification somewhere along the line.

The *if* amplifier of the SX-140 incorporates a selectivity control, which at the CW end of its rotation puts the stage into oscillation, providing a bfo for CW and SSB reception. Obviously, this stage was being used to maximum advantage, and I could not possibly get another db of gain from it. However, it struck me suddenly, as I was looking through some catalogues, that the main difference between the SX-140 and quite a few receivers in the



$200 bracket was that the more expensive receivers used two *if* stages to the SX-140's one, albeit regenerative.

The solution was suggested immediately, and it turned out to be most sucessful. I added another *if* stage to the SX-140, basically the same as the original one, but without, of course, the selectivity-bfo circuitry.

A letter to Hallicrafters brought back an *if* transformer (I couldn't find one for 1650 kc in any parts catalogues). A trip to Cortlandt Street brought back a tube, a socket, and a few resistors and capacitors, and I was ready to take the irreversible step: putting the hacksaw to the chassis.

To understand the placement of the new components, refer to the picture of one corner of the underside of the chassis. In the original, the upper (meaning closer to the front of the chassis) tube and transformer are not present, and the signal goes from the mixer to T2, to the *if* amplifier, to T3, and to the detector. In the modified version, the first (original) *if* amplifier feeds the new Ta (closest to the selectivity-bfo control) which, now being the interstage *if* transformer, feeds the new Va (second *if* amplifier, and tube closest to the audio gain control). Va feeds T3, which goes, as before, to the detector.

All of this is explained in the schematic (Fig. 1). All new components are enclosed by the heavy lines, and broken connections are indicated by a heavy "X". It is clear that V3 has been rewired so that it is feeding Ta rather than T3, T3 now being fed by Va. Components Ca and Ra are inserted to isolate the first *if* stage from the avc line; a similar circuit (Cd, Rc) is used for the second stage. These are to prevent feedback and possible self-oscillation through the avc line. For a similar reason, the new *if* stage is isolated from B plus by a circuit (Rb, Cb, Cc) similar to that used in the original stage.

The new *if* stage is designed for high gain

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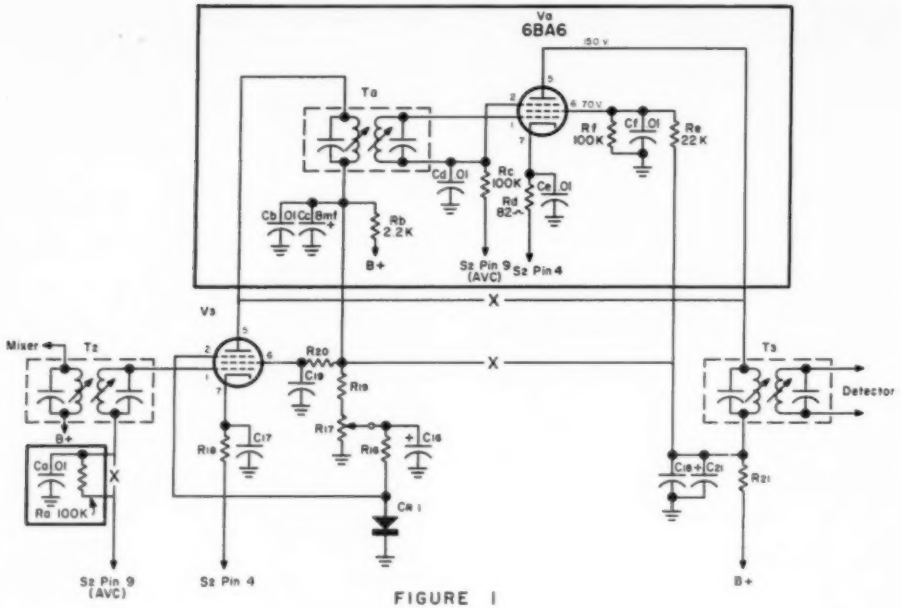

FIGURE 1

and as much reaction to avc as possible. A voltage divider, rather than just a dropping resistor is used to feed the screen to prevent screen voltage from rising in the case of low screen current (high avc) and thereby negating some of the effect of the avc. For good measure, grid 3 is also returned to the avc line.

A few notes on mounting and wiring: refer to the picture of the top of the chassis as well as the bottom. The position of the new components is not really critical, but take care to keep clear of the tuning knob shaft and the dial cord. For the transformer mounting hole, I used as a template a transformer mounting wafer from the junkbox. If you can't find one, it is a good idea to spend the few cents to get one. Trying to judge the oddly shaped holes by eye will invariably result in a few more gaps and scratches than are necessary. When wiring, keep all leads, especially those on the

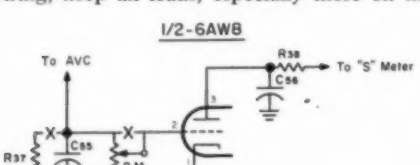

FIGURE 2

many .01 mfd bypass capacitors as short as possible. A one-terminal tie strip is used for the junction (avc end) of Ra and Rc.

Alignment procedure is exactly as it was, except that one more transformer is now included in the sequence. It is possible that, because of the increased gain, use of a 1650 kc crystal in the calibration oscillator circuit may overload the *if* circuit. In this case, you must use an external generator.

While adding the extra *if* stage, I decided to shield all of the tubes except the output-S-meter amplifier. The mounting rivets on the tube sockets are easily drilled out, and tube shield bases installed with 4-40 hardware. Shield the output tube only if you collect cracked 6AW8's.

The additional *if* stage changes the SX-140 from a receiver which is a good value for the money to one which is really a pleasure to use. Bands, which were relatively quiet before, really come alive. I had been somewhat worried about the chances of the first *if*, when in a state of bfo-producing oscillation, overloading the second *if*. Luckily, this never came about. Operation of the receiver is the same as it was previously, although everything seems to work a bit better. AVC action holds signals a bit steadier, and the S-meter really moves. A note about the S-meter: I have always felt that S-meter readings were purely

relative, and that reporting an 85 db over S9 signal would send the other party in a QSO into a state of bliss. However, if you attach a particular meaning or mystical significance to S9, replace the grid resistor of the S-meter amplifier with a potentiometer (see Fig. 2) and adjust for any amount of swing you desire.

. . . W2HTN

Parts List

Ca, b, d, e, f—	.01mfd. 400v disc.
Cc—	8mfd. 400v electrolytic
Ra, c, f—	100K ½w 10%
Rb—	2.2K ½w 10%
Rd—	82 ohm ½w 10%
Re—	22K ½w 10%
Ta—	1650 kc if xformer (Hallicrafters part no. 050-000751)
Va—	6BA6

"Rig hr is Homebrew, OM"

Robert Swearengin W5HJV
Box 26
Durant, Oklahoma

"Rig hr is homebrew OM." I cringed. The hated words, fraught with superiority and contempt for my store-bought rig, burned to the very depths of my being. I cursed inwardly as I remembered the good signal report I had given the transmission before.

I flipped the switch and sent his call six times. "Sorry OM, unable to copy . . . ur sigs now 447 . . . 73 and hope U get ur rig straightened out. That should give him something to think about," I muttered.

I glared at the gleaming transmitter on the operating desk, and knew I was through; a downtrodden victim of amateur radio's most vicious class system.

Fishing a radio magazine out of the cluttered bookcase, I ignored the saucer full of cigarette butts which my elbow knocked on the rug, and flipped idly through the pages. A quick sale of the rig and I could make those much needed improvements on my stamp collection. The neighbors would stop complaining about TVI, the XYL and I could get acquainted again, and . . . the pages flipped over to a schematic diagram and parts list.

"Hmmm . . . single 6DQ5 and not too many big words in the text . . ."

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by the fascination of the creative process. There were difficult times, yes, but the thought of being one of the chosen few spurred me on to even greater heights. I found myself leaving the office earlier each day in order to devote more time to the project. As time wore on I began to lose weight, and developed a pinched look about the eyes from the many hours of staring at the bargain sections of catalogs.

As my junkbox and savings account decreased, I became crafty and learned to scrounge mercilessly. My parents are still wondering what happened to the rubber feet on their portable record player, and local hams now require me to weigh in and out when I visit their shacks. Also, by special order of the engineer in charge, I have been forever barred from entering the electronics department of the local college.

After what seemed like years, I sat at the operating desk and gazed at the 6DQ5 rig with misty eyes. It was ready to go on 80, 40, and 20. "Nobody works the higher bands anymore," I said to myself, "And besides, I can't afford to waste any more time fooling with parasitics and neutralization." My vocabulary had now expanded to include some of the more impressive ham radio type words.

Pride of ownership in the new rig was short lived. The thrill of sending "Rig hr is homebrew" was offset by mediocre signal reports received from stations contacted. "Smart alecs with comercial gear," I told myself, but inside I knew there was only one solution . . . HIGH POWER.

Now that I was experienced, it was a breeze to throw together a pair of grounded grid 811A's for 80, 40, 20, and 15. It worked FB too, except that the scrounged variable didn't have quite enough capacitance for 80, the final overheated on 20, and the parasitic chokes blew on 15. But then 40 meters has always been my favorite band anyhow.

Well . . . guess that's about the full story and things have worked out pretty well over the long haul. Since my business went bankrupt, I've had plenty of time to devote to forty meters, and I'm able to buy a few surplus parts for my latest projects out of my unemployment check.

Maybe you'll hear my rig on the air one of these days. If you do, give me a call and I'll give you the construction details. But leave your selectivity switch on the broad position. . . VFO hr is homebrew OM.

. . . W5HJV

Superhet or Regen?

Gus Gercke K6BIJ
Box 143
Weimar, Calif.

Proponents of the Stanley Steamer claim that automotive engineers might have gotten further with engines for cars if they had put their millions of dollars of development into steam instead of internal combustion. They might be right. Many electronics engineers, not quite so hung up on orthodoxy as others, feel the same way about regenerative receivers as opposed to superhets.

We have to admit that superhets have had a lot more enginering than regens, and it is just possible that this is one of the reasons that we don't today have regenerative receivers that are as good as superhets. The experimenter who wants to work with regens finds out that the parts required are different from superhet parts and are either hard to find or don't exist.

The characteristics of transistors make them much more promising for regenerative circuits than tubes and it is possible that once we get over "tube thinking" we will be able to work up some really good circuits. Here are some of the factors that I found important in playing around with a transistor regen circuit.

Regeneration control: often a headache; regeneration is not smooth but comes in with a "plop". This is only an indication of a wrong design—wrong voltages, wrong number of turns on a "tickler", or the "tickler" is too close to the base coil. The "plop" can *always* be eliminated with a little experimenting.

Your variable condenser makes noise near regeneration point and produces unstable conditions around weak signals. This is a result of

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rubbing of metals between your rotor and the condenser frame (sliding contact, metal ball bearings). At maximum sensitivity even the best condensers will do it and are therefore useless. The only exception is a "butterfly" with insulated rotor and Pyrex ball bearings (Hammarlund "VU" Type) Their capacity is too low for most applications, so—other means of tuning your tanks are necessary. You can minimize this effect by making your variable capacity a fraction of total tank circuit capacity; this will lower your tuning range.

The loading or pulling effect makes it necessary to readjust your regeneration control and/or antenna coupling as you tune across the band. This readjustment will considerably affect your tuning, will often result in losing your station, and will make any accurate calibration of your dial impossible. This can be eliminated by using a small antenna that has no resonance spots near your frequency, or by using an RF stage with untuned output (you will get little gain but the "pulling" will be gone).

The frequency changes as you adjust your regeneration control. This happens with transistors only, and is a result of changes in the interelectrode capacity due to changes in voltages. Trouble of this kind is eliminated by

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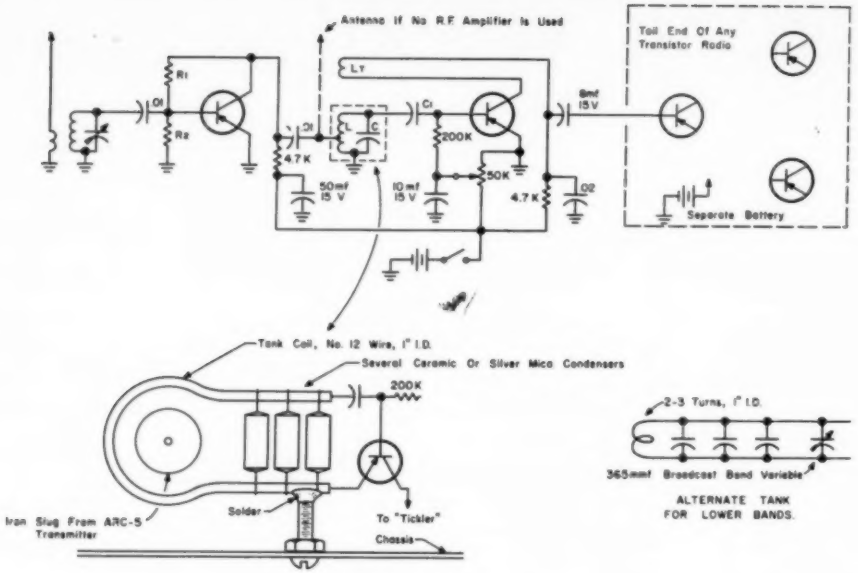

FIGURE 1

	80M	40M	20M	15M	6M
L	3T	2T	1T	1T	1T
L_T **	6T				

To resonate at this band

C	mmfd *	8000	6000	1000	300	100
C_1	mmfd	100	100	50	30	30

* C—must have several condeners (about equal size) in parallel to decrease their inductance.

** L_T—same # as L but #24 wire. R_1 & R_2 to provide bias for rf amp. transistor you are using.

making your regeneration smooth and stable over a large portion of the band, or *is made use of* as a fine tuning vernier (useful in SSB especially).

A simple receiver that will outperform a number of Superhets (on a single band; all attempts to produce satisfactory bandswitching failed thus far) could look like one on Fig. 1.

With proper transistors it will operate equally well on 2 meters as on a broadcast band. There is nothing really new about its circuit, the only unorthodox part is its high "C" tank; it seems that regenerating transistors "like" this type of input, they quiet down and behave real well, while with "normal" (tube thinking) components they get temperamental. This high "C" tank, plus a small value of base coupling condenser tend to eliminate the harmful effect of changing interelectrode capacitances produced by varying dc (and possibly rf) voltages between transistor elements.

2N169A transistors (6v-9v) were used on lower bands (40 & 80) and a nameless cheap Philco PNP (72c) that is supposed to work to 100 mc was used on higher bands. It worked best with 1½v up to 50 mc; it was necessary to double this voltage to get higher. Not all of them will work good above 10 meters.

. . . K6B1J

Getting Publicity

Fred Bonavita W4WUQ/4
3909 Delmont St., Apt. 2
Richmond 22, Virginia

"Give'em all the facts in one neat package, and ninety-nine times out of ten they will see the light of day."

That's what a newspaper reporter (who later became my first city editor) told me about ten years ago. While his percentages may be a little off, his advice was correct. And this advice is the answer I gave another ham recently when he came into our City Room to find out why a press release he had sent us had not been used.

The press release (handout) had been received alright, and it wound up on my desk to re-write. It came with an editor's comment: "Here, you deal with this if you have time. You know what they're talking about. I can't make heads or tails of it."

This, unfortunately, is a situation frequently confronting newspapers; it is not limited to amateur radio groups. An inadequate news handout is not an uncommon item, especially in a newspaper office where scores of such items appear daily.

But what of the handout in question? Why did it fail to see the light of day in print? And what can be done to bolster newspaper, radio and television coverage of group activities?

Taking a quick look at my friend's handout, it is easy to see just where and how it fell shore. Witness:

"A nationally known VHF authority will address the Blank Radio Club Wednesday at 8 p.m. He is W4XXX, and he will speak on the problems of bouncing Two-Meter signals off Echo One satellite. The meeting will be held at the firehouse and is open to the public."

End of handout. End of information. End of chances to get publicity. What, asked my friend, was wrong with the way it was written?

It simply did not contain enough information from which to write a story, I said. And, above all, it contained no names of persons to call to verify the information or from whom to obtain the missing parts. Analyze the handout.

Questions which come immediately to mind are:

(1) Which Wednesday night? The use of a specific day of the month would have eliminated any question here. Since the handout was received on a Monday, was the meeting the following Wednesday or a week away?

(2) Does W4XXX have a name, or is he just a call? Where does he live? (My Call Book was at home and of no immediate help). And what makes him a "nationally known VHF authority?"

The problem of explaining the radio terms to the reader was mine. And it can be said that with a little extra digging I could have come up with some of the missing information. However, the press of routine assignments and duties kept me from devoting additional time to chasing down answers to the handout. There are few newspapers these days that are willing to tie up a reporter in plugging holes in handouts.

My friend left with a better understanding of what a newspaper requires in the way of

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information before publishing a story, even one that will run only two paragraphs.

Of course, it is impossible to say that every newspaper will follow an "A-B-C-D" pattern in its requirements; these requirements vary just as newspapers themselves vary. But there are certain basics common to all.

These are the old "Who, What, When, Where, How and Why;" but it's necessary also to give complete details of each. For instance, the "Who" may be known in ham circles as Doc Smith, but unless Mr. Smith's given name is Doc, he is identified better as J. T. Smith or better still as Dr. J.T. Smith, if he happens to be a doctor. Some newspapers will go so far as to identify him as J.T. "Doc" Smith, but their number, fortunately, is on the decrease.

The "Why" angle of news is becoming an increasingly important item, and if the "Why" is unusual, it may be the vehicle needed on which to "hang" a story.

Include the names, addresses and telephone numbers of all persons who may be contacted for verification and amplification of a handout. Some newspapers refuse to print even a one-paragraph item unless every detail can be verified, and they are right in doing this. This, by the way, is a major reason why my friend's handout failed to make print.

Tell the newspaper of any picture possibilities. Some editors react immediately when told of an event with, "Any pictures in it?"

Most newspapers rely on out-of-town correspondents to furnish news of their localities not offered by the wire services. As an aid to these correspondents, these papers usually prepare a style manual or writing guide spelling out how to prepare news copy. A copy of this guide or manual is an invaluable addition to any club's publicity department.

A club publicity director should drop into his local newspaper office(s) and become acquainted with the editors, reporters and photographers. He should let it be known also where he can be reached should the newspaper have a question. He should find out what they expect of him and what he may expect from them in return.

Remember, the key to good publicity is to have a worthwhile news story and then present all the facts in a tight, information-filled package that "touchs all the bases." And do it while the news is fresh.

"Give'em all the facts in one neat package, and ninety-nine times out of ten they will see the light of day," the man said, and he meant it.

. . . W4WUQ/4

More Comments on RM-499

The following were written on some of the IoAR RM-499 ballots

In Favor of Proposal

I think that you have gone overboard in opposing RM-499. I believe editorials in two issues of *73* would have been reasonable and sufficient, but by continuing you are acting like a baby whose toy has been taken away. RM-499 if passed will be very beneficial, and the equipment that may have to be set aside for a few months will not be destroyed by being set aside. * We should never have left incentive licensing in the first place. Let's get the appliance operators out of amateur radio. * Would prefer to see all conditional and general class "blanketed in" just as class B's were "blanketed in" with general class some 10 or 11 years ago. * Time to separate the men from the boys. * I am getting terribly tired of the yapping in your magazine. * Everything our country has accomplished was because of incentives. Only communism tried to keep everyone at one level. I say let the dummies get out of amateur radio. * I hope your poll comes back 100% in favor of incentive licensing! I think you're fighting a loosing battle. * The guys who now are yelling the loudest most likely never bothered to vote for their directors to ARRL. * I think this is what should have been done a long time ago, those with the higher grade of license should enjoy the special privileges for their extra effort. * I feel the regulations as proposed are sound. * Wayne, your greed to build up circulation by buttering up the disgruntled would be CB'ers is seconded only by the mad mouthings from the west coast. I am with you 100% if you will fight for a better informed amateur. Surely you are not blind to the danger here at home to our 10, 6 and *2* meter bands. Let's all pull together to save amateur radio. Incentive licensing is too little and too late. But it is a start toward cleaning up the mess the greedy few have made of the art. * It's about time everyone wasn't allowed to run wild. * You must be

crazy. * I am only a general class licensee but I am certainly not too lazy to get a class A. *

Opposed to Proposal

Thanks for bringing the other side of the issue into the open. * I oppose the proposal even though it will not directly effect me, I also object to the ARRL's arbitrary handling of this matter. * Something is needed, but I deplore the ARRL's methods. * ARRL's action on this issue has prevented me from joining the League. I see no need for "incentive licensing." * This is the way proposals should be made SIC EM Wake up the ARRL. * I hold an advance class license and have voted against this proposal because a good many of our conditionals are women and another exam would be an extreme hardship. * If the ARRL continues its present course I don't know how much longer I will be a member: * This is the proposal of men afraid of competition — no matter how little. * They are out of their cotton picking minds! Not only am I opposed to this proposal itself, but I think that if the ARRL gets its way it will start trying to legislate other items such as pushing Techs off 6 & 2 etc. * Member of ARRL from 1957 to January 1964. Did **NOT** renew! I am opposed to the proposal as it now stands. I am in favor of some type of incentive licensing. Example: New frequencies for extra class license. * This proposal sounds like a destruction of the amateur bands. They are not for us, but **AGAINST** us. * Best of luck. Hope we win! My gripe is a poll such as this type was not taken. * I wouldn't have minded getting on the train, but I didn't like the railroading. * I am in favor of extra privileges for those with licenses above general and conditional. * Leave well enough alone; the air belongs to everyone, not a select few who are engineers. * By acting as an absolute oligarchy the ARRL membership is no longer represented. * There should be only one class of ham license, "amateur class" with all amateur privileges. * Opposed vehemently! * I want to be represented rather than told what to do. * Too much evidence is available to indicate that the ARRL is not acting in the best interests of ham radio. * I do not believe this proposal will accomplish anything, except much expense on the part of the FCC. * I don't think that a few individuals have the right to propose such a plan without first taking a consensus of opinion. * ARRL phooey!! * I am glad to get a chance to vote on this issue though Ioar. * I am dropping my ARRL membership when it expires. * Hurray for Wayne Green * Nuts to the ARRL headquarters staff. * I am against railroading any matter, whether it's ham radio or otherwise. * I quit the ARRL. * Will cause hardship for too many. * Idea has merit, if it covered all bands, but the method is rotten. * I would have liked at least a chance to voice my opinion. * It's about time we had a "two party" system in ham radio. * It's about time someone did something about the ARRL. * Keep amateur radio a hobby. * Back you to the hilt. * I feel that all amateurs should attempt to qualify themselves technically without limitations and laws. * I'm again it. * glad to find someone who will fight for our rights. * I am in favor of improved operation but I am opposed to the assumption of any autocratic group setting themselves up as Big Brothers. * Let Wayne do it his way, which is in the interest of majority of hams. * I am in favor of incentive but not one that takes away privileges from present licensees. * Prefer lower power limits 250 to 500 watts. * More frequency can be acquired if asked for. Wrong approach being used. * I believe incentive means to give a person something which he does not have, but has a desire for, by offering him a means to achieve the goal. I agree in the general idea of improving the amateur operations, but certainly the manner in which it is proposed and the method used by ARRL makes me very unhappy. * Let's cut the power down to 200 watts everybody on all bands. * ARRL has rocks in their head; most amateurs are amateurs not electrical engineers. * I am disappointed in the ARRL; even unions give their members a chance to vote. * We need some changes but not the one proposal submitted. * The highways are crowded and they are not taking any cars off the highways. They're building new roads. * I am not in favor of ARRL proposal at all. *

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Harvey Brain VQ9HB

Aldabra

Being a voyage to Aldabra by the 36 foot Gaff Cutter Yacht "LUA LUA," crewed by the owner Mr. Bindshedler, by Mr. Gus Browning W4BPD, and by Mr. Harvey Brain VQ9HB.

On the 22nd of April, 1962, the peace of a meaningless Mahe day was abruptly shattered, for Ben and myself, by the arrival of Mr. Gus Browning, a well known American radio ham. He was going to make a DXpedition with us to the Aldabras. 'With us' needs qualifying. Ben, the owner of the yacht, is no radio ham. In fact, I am fairly certain that he now regards all hams as being certifiable!

Gus did not loiter. In fact everything Gus does is 'at the double'. So that the time it took him from the Customs to the Short Pier wasn't worth considering. "Hey: is that the little yacht down there?" "Looks OK to me." "Hey: Let's get aboard." "Hey: just hand me down that transmitter there . . . . . .this cabin table, right here; why that will take all the gear." "Guess we can all eat our food on the floor—or somewhere." Ben cast me a somewhat agitated glance. It did just cross my mind that this trip might not be quite so restful after all.

We left by the Cerf Channel late on Wednesday afternoon, the 25th of April. We ghosted down the East coast of Mahe to a light North Westerly breeze, weathering the Southern end of the Island just after dark. From there we set a course for Alphonse Island 210 miles away, and to the South of the Amirante Islands. The breeze became fickle. The sea was calm. So Gus was happy. Not only was Gus happy, but Gus was getting organized.

At Mahe Gus bolted down on the "Lua Lua's" small stern deck, a 115 volt ac generator. There it was best calculated to snarl up the mainsheet. Climbing the shrouds, all the world like some convolulus from the tropical forest, was Gus's 'smack up to date' ground plane antenna. There it was best calculated to interfere with the sails; our main means of propulsion. Hi. Still this was a DXpedition! Something had to be sacrificed before the shrine of Radio.

The generator was now spouting flames and the noise was quite infernal. Ben's watch below, but Ben was not to sleep. Gus himself despises sleep. Gus thinks that time so wasted is quite lost to ham radio, and irrecoverable of course. Gus down in the cabin was seated before his rig, the meters and the dial lights yellow in the darkness before him. "VQ4GT this is VQ9A Maritime Mobile. Good evening Leny. Glad to meet you Leny. All OK here and we're about 12 miles West of the South of Mahe. Old Man Leny; you and George get us a weather report every evening at this time, *please*. Tell us when there's one of them hurricanes about. Hi. Be looking for you every day this time—1700 GMT. Good night Leny and 73's. VQ4GT from VQ9A Maritime Mobile on the Indian Ocean. Goodbye Leny. . . . . Now all you boys calling there; come in now, *please*, but not all at once. . . . . ."

That diabolical invention nesting on our stern—the 115 volt ac generator—continues to shatter the peace of the night. But from my place at the tiller I can just hear disembodied voices from the loudspeaker in the cabin below. Fantastic that some chap in London can follow our wanderings; can actually speak to us day by day. Likely he is wistfully wishing himself here with us on the Indian Ocean. On the Indian Ocean ploughing across blue sunlit seas. Away from it all: away from the fog and the grime of London's City.

Eager voices. "Hallo Gus old Man. Very glad to meet you Gus. Please Old Man Gus; don't forget to be looking for me from Aldabra. Cheerio Gus and 73. Sure was good to meet you Gus . . . . . ."

At 2200 hours ship's time Gus pulls the big switch. The generator peters out into silence. It has been decided that the enemy must be 'throttled' at this hour each night. Somebody has to sleep some of the time. Silence now and the stars steady above me. Silence and the dark mysterious sea around me. Silence but for the swish-swish and the gurgle of water as the 'Lua' swings along at three knots or so. I do not dwell on these things for long but only on my bunk below, where later the black cat—now asleep on the bench by my side—will follow me no doubt, when my watch on deck is over.

1000 hours ship's time the next day; April 26th. The sea is not so calm. Not so calm at all. Ahead, over the undulating swells, drab green tops of palms seem to float on the misty horizon. I, for one, am happy to see this island. I wonder if Gus would be happy too? "Hi Gus—how about all that washing up you haven't done?" "I guess I can't do that now at all; I'm just looking for my seasick pills." "Come on Gus, they say there's no better cure for sea sickness than to be occupied." "I sure am occupied; I'm still looking for them sea-sick pills."

Saturday, April 28th. 1700 hours GMT. Weather fine and clear. South Easterly breeze and a calm sea. Peace and quietness should be with us, but that generator is running again. "VQ9A Maritime Mobile from VQ4AQ in Nairobi. Good evening Gus. Evening Ben. Evening Harvey. George speaking. Gus: I have weather report. 300 miles South of Mahe, squally Southerly winds; 20 to 25 knots. Sea moderate. Best I can do. That's all for to-night so over to you Gus, and let's hear your voice Harvey; haven't heard it for a long time." ". . . .VQ4AQ, Nairobi from VQ9A Maritime Mobile. All OK George. Your signal is 5 and 9: fine business. Weather still OK here. Hey: we've just been to an island and I've seen all about how they make copra. When we was goin' away George, why they gave us a loaf of bread an' two roast chickens. That black cat, he spent all last night, George, just sitting under that roast chicken locker. He never even moved. We're just looking around on the chart now to see if there's any more of them islands about here. Hi."

Early the next morning the two amateur navigators had found yet another island. "Gus: come up and see Alphonse." "How do you guys know that's Alphonse. "Might be some other island." "All look the same to me." "Well Gus: we usually call in and ask the Administrator."

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Gus W4BPD and friends.

A rising Southerly wind accompanied by a considerable swell made the usual anchorage untenable and so we had no option but to enter the lagoon. This necessitates following the breakers round to the South, and then by way of 'Le Canal de la Mort,' (The Death Channel)—blood chilling appellation—one comes to the pass. There, with the Red Ensign at the masthead, we awaited a pilot. No boat, however, was seen coming our way, and the sky was looking black and squally to wind'ard. Ben, therefore, decided to do his own pilotage. And so we hove up the centerboard—thereby reducing the vessels draught to something less than three feet—started the engine and entered the pass.

The passage through the reef can be dangerous, especially during bad weather when the sea breaks all around the narrow entrance. To-day, however, the pass was on its best behaviour. The sea broke sporadically as we entered. Suddenly the water beneath our keel became as clear as crystal and one could see every little detail of the bottom. The corals were splotched with marvelous colors: mauves; olive green; chromes; rust red. Here and there a stain of brown—the occasional niggerhead—but these were easily avoided. It all looked horribly shallow, though I do not suppose that anywhere in the channel was there less than 12 feet of water. Clear of the shallow rim of the reef the water deepened and became the turbid green of decaying vegetable matter held in suspense in still water.

Before us now, the island with its fringing golden beach; its crown of lustrous palms. Then came the administrator, approaching in a white gig. We were given a very cordial welcome.

Monday, 30th. April. The generator is at it again, for it is 1700 hours GMT. "VQ9A Maritime Mobile this VQ4GT. Good evening Gus. I have your weather report. 'Unsettled weather 450 miles South of Mahe. Wind 20 to 2[illegible] knots; squally; backing to SE or ESE. Se[illegible] moderate. . . . . ." "VQ4GT is VQ9[illegible] Maritime Mobile. All OK Leny. You're 5 and [illegible] here out in the Indian Ocean with Alphons[illegible] Island 6 miles astern. No wind at all her[illegible] Leny and we're under engine. Tell Georg[illegible] we've just been to another island. That blac[illegible] cat, he's sitting underneath the roast chicke[illegible] locker again. Guess we must look around: se[illegible] if there's any more of these islands about here[illegible] Hi. Good night Leny. Tell the boys no[illegible] only 360 miles to Aldabra. 73's. . . . . ."

"All you boys calling me right now. I'm pulling the big switch. VQ9A Maritime Mobile don't count as no new country. Saving al[illegible] the gas for when we arrive at Aldabra. . . . . ."

Tuesday evening, the first of May. VQ4GT . . . .450 miles South of Mahe . . .25 knots. . . squally. . . . ! ! ! A force 5 wind now blows (16 knots). Ben has pulled down the first reef in the mainsail. He has set No. 1 foresail Our sizzling wake speaks of six knots.

Darkness and a drab horizon. Patches of clear sky brilliant with trembling stars playing hide-and-seek amongst the drifting trade wind clouds. But I cannot abandon myself entirely to the wonders of the night sky for I have a course to steer. Three parallel phosphorescent lines shimmer from the compass dial before me. It is my business to keep them parallel. I am conscious that the wind is cool on my shoulder and on my neck. I sense, though unseen in the darkness, the black cat is close by my side. Those faint phosphorescent shimmering lines. . . . . I must keep them parallel. They mesmerise with their dancing ghostly light. One hour: two hours: three hours: more than half of my watch has passed. I will certainly fall asleep. I bestir myself; disturb the black cat; lash the helm; get up; study the horizon all around. Nothing but the dim forms of the silently working sails. Nothing but the swssh—swssh—sss as the cloven water laps astern, frothing and foaming into our luminous wake.

Thursday May 3rd. 1700 hours GMT. The generator almost drowns the voice of the wind. "VQ4GT from VQ9A Maritime Mobile. OK Leny; say let *me* give *you* our weather report. Wind ESE force 7 to 8, (30 to 37 knots). Sea high and steep. with breaking crests. Harvey says we are now running under twin foresails on a WNW course, and 24 fathoms of warp streaming astern to slow us down and to keep us steady. He says Cosmoledo is about 36 miles on a bearing 274 true—as far as he knows. He says he hopes to miss it! This black cat, Leny, down here right by my side, he don't see no

fun in all this; he sees no fun at all in all this rollin' and rockin' around."

0200 hours the next day—Friday, May 4th. Ben and I are both on deck. The sea is very confused, pyramiding and with breaking crests. The wind blows in great gusts from a clear sky. Almost one would say that we were in shoal water. The cries of seabirds are heard all around. But the moon is up and 7 x 50 binoculars reveal—nothing.

345 hours. Ben sets trisail and storm jib, and hands the twin foresails. We change course to 240 degrees magnetic to close the land. Strong currents run here. Our position is anybody's guess.

0800 hours. In spite of the high sea, the appalling motion, and the hazy horizon, Ben managed to get a sight. Worked out it gave a position line 30 miles farther to the West than our deduced reckoning. So we might be quite close to Aldabra! But Ben, unused to this area of fierce currents, was unconvinced and inclined to doubt his sight. 0930 hours; I obtained another sight and this put us even nearer to Aldabra than the previous one. In fact, if it could be relied upon we should soon be seeing land.

Time went by and nothing solid was visible across the waste of confused rough water; the squalls of rain; the lowering clouds. "Ben, there's no chance, I suppose, that we might have mistaken the date and so looked up in the wrong table?" Ben was sure of the day and date—Friday, May 4th. Then he wasn't so sure. "Could it be. . . .?" Do you think, Ben. .?" Well; could it be Saturday, May 5th. for instance?"

"Gus; start up the stinkpot." "Ask some fellow what day it is." "They'll think we're all crazy guys." "CQ: CQ: CQ. . . .CQ. 20 meter phone—from VQ9A Maritime Mobile. Will somebody come in, *please*?. . . . .OK Old Man, this VQ9A Maritime Mobile from somewhere in the Indian Ocean." "Ben; there's a guy here

Harvey VQ9HB

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VQ9HB

in Durban. He says its May 4th all day in South Africa. Wants to know if he can send two more guys with two brand new sextants? Hi."

By 1700 hours ship's time we were under the lee of the North Eastern corner of Aldabra, and only too thankful for the certainty of a quiet night at last, away from the swell. The settlement was still some 18 miles to the Westward but we knew that it would imprudent to approach this indifferent anchorage after dark. We therefore eventually hove-to to the Eastward of the Main Pass and awaited the break of day.

On our arrival at the settlement the next Administrator arrived with the big pirogue and Gus, in command of all his baggage, was ferried ashore like some Eastern Potenate—even though he lacked the Royal Umbrella. Then Prince Charming and his shining modern equipment was installed in the Guest House ashore, while we, with the 20 years old converted ex. military transmitter, slunk off in the 'Lua Lua' into the lagoon, where we hid ourselves, like Cinderella, in the remotest corner that we could find.

The lagoon is very shallow and dries out over a large area at low water. Ben beached the 'Lua' on hard, clean sand, and legged her up, so that during the period of the spring tides he could clean and paint the bottom. Then when the receding tide left the vessel high and dry we humped all the radio equipment ashore and installed a bell tent on a nearby spit of land. This situation was not ideal for it was surrounded by mosquito-ridden mangrove swamps and moreover there was scanty protection from the prevailing wind. However, this area contained a number of casuarina trees of a suitable height for the installation of the antennas.

By 1400 hours on May 5th the work ashore was completed. The tent was up; two antennas installed; the wind motor errected; a table, supported on a number of 4 gallon petrol tins, had been improvised for the gear. So VQ9HBA was now ready to go on the air.

VQ9HBA was a very modest affair. The transmitter, a wartime Collins TCS-12, drawing power from two dynomotors which, in turn, depended upon 12 volt heavy duty storage batteries. It is unlikely that the transmitter output exceeded 16 watts or so. The receiver, an old Eddystone 750, was efficient but made heavy demands on battery current. For charging the batteries we used Ben's 300 watt, 12 volt petrol generator, for which we had brought 16 gallons of fuel, (we used just 7 gallons for about 45 hours of operating). But as a standby we had the portable wind motor, so that a major breakdown of the petrol generator would not have put me off the air. We were about a mile from Gus and at that distance there was no mutual interference.

At 1400 hours GMT. I started operations, using a vertical end fed half wave antenna. "CQ: CQ: CQ. .from. .VQ9HBA on Aldrabra. CQ: CQ: CQ. . . . . ." No response. Nevertheless plenty of stations could be heard between 14 megacycles and 14.100 megacycles. I confined my attention to 14.085 megacycles. No contact. I checked the output with the neon lamp and that seemed all OK. So I changed over from the half wave vertical antenna to the full wave horizontal. The latter had been installed in a SE/NW direction which was not ideal for working the United States, however, the trees were orientated in that direction and so it was 'Hobsons Choice'. "CQ: CQ: CQ. . .from. . .VQ9HBA on Aldabra." Then at 1415 hours GMT ZS5KU in Durban replied, giving me RST 599. He had the distinction,—if you like—of being my first contact at Aldabra. He was elated. He had a rare new country. I was elated. He was my first contact from Aldabra. After this the stations started to roll in but I was delighted that No. 3 was VQ4GT, my old friend, my very first ever radio contact—Leny. But the W Boys, where were they? I heard not one.

Gus, in the meanwhile was in trouble. He had forced and broken an aluminium needle valve of the ac plant carburettor, and the broken point had jammed in the main jet. Can't think why aluminium was used for the valve. It surely should have been in brass. Anyhow, we had the good fortune to extract the broken piece by heating the end of the main jet and then plunging it into cold water. But now Gus has more trouble. A crushed plastic carburettor float valve. Why must they make *this* in plastic? Usual modern stuff. Pretty, but

not durable. So now we'll have to fiddle this up somehow or Gus is off the air for keeps. Prefer my old solid transmitter and batteries; plus windmotor; plus charger. Ancient and despised but infinitely reliable!

Aldabra is a raised atoll consisting of four principle islands. Their structure is of coral, or coral rock, the seaward face of which forms abrupt overhanging cliffs from 12 to 15 feet high. The islands are largely covered by almost impenetrable pemphis jungle and the shores of the lagoon are fringed by extensive mangrove forests. All along the foot of the dead coral seaface one finds little white sandy bays. And each afternoon, in the warm pale green laughing waters of one of these, I used to bathe. On a jagged pinnacle of rock nearby, a pure white egret, a bird without fear of man, would cock one beady eye on me—in curiosity. He would think, no doubt, as I sported in the playful swells, "this seems a new and interesting specimen; wonder what he thinks he's up to?" Each day he was there awaiting me. I like to think it was always the same bird.

The walk back along the dunes twists and turns amidst the pemphis shrub. And every clearing offers glimpses of the lagoon and pass, of beauty almost beyond belief. The swift waters of the pass, steely blue and sparkling in the sunlight. The lagoon, a patchwork of color where deeps and shallows give rise to blues and greens and turquoise, and all a-glitter under the deep blue sky. While here and there, small barren islets; jagged fragments of this dying atoll; litter the lagoon and make one think of worlds long cold and dead. All this can bring great contentment to anyone whose mind can be in harmony with these values.

2230 hours local time. The mosquitos from the swamps are biting my legs in the tent. "CQ: CQ: CQ. . .W: W: W. . .CQ: CQ. . . . ." But the W Boys do not reply. Outside is black night and a rising gale. Inside the tent on the camp bed the black cat sleeps on. He knows how to jump off the boat and on to the sand at low tide. And he has discovered my retreat. "CQ: CQ: CQ. . .W: W: W. . . . ." But the W Boys are mute. At 2217 hours—"VQ9HBA this is UA3CT. Good evening Old Man. My name is Kon and my QTH is Moscow. Your signal is 589. Fine business. I am very glad to meet you. Please do not fail to QSL. Many thanks Harvey for the vy fb QSO and I sure hope to meet you again. Vy 73's. VQ9HBA from UA3CT in Moscow." The gale is increasing in strength and the tent is rocking and flapping. Two German stations come in—DL1QT and DL5DU,—and then, at 2306 hours

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one side of the tent blows in and the light goes out. I struggle in the darkness under flogging canvas and manage to find my flashlight and extract the black cat.

Friday May 19th, and two days before leaving the lagoon. We set up a 136 foot long wire antenna orientated in an approximately ESE/WNW direction. The average height of this antenna was about 36 feet.

Quite by chance, I had discovered that the 14 megacycle band opened up for a very brief spell at 0340 GMT—almost precisely. The heavy blanket of static which hindered us during most of our stay at Aldabra, fell away then like a curtain drawn aside. So at 0130 hours GMT the next morning I was already waiting expectantly at my post. I was soon to experience several shocks—of a non electrical nature.

Soon the first light of day filtered through the clouds. I was tuning the band but was unable to find any W's. Only an occasional Russian or Pole broke through the abnormally thick static 'fog'. I did not contact these. I was saving my batteries. Suddenly—Wallop—bang—twang. The transmitter almost leaped off the table. Followed other disterbances of a similar nature at close intervals. One might have supposed that the long wire antenna was being subjected to a peculiarly accurate bombardment. So it was. Outside I soon discovered the explanation. A flight of boobies had hit the wire. Now they were all out of formation and milling around at various levels in complete disorder. One giant fowl seemed considerably annoyed. Having shot up into the air after the initial impact he then dive-bombed his invisible enemy. Don't tell me that the booby is a stupid bird. That evening the same flight, returned from their fishing at the same height. As they approached the wire, in line ahead, each bird 'ducked' (if I may use the pun), and passed safely underneath.

Anyhow, when I had finished cursing the B's, I returned to the set in search of some W's. And at 0313 hours GMT Ben placed a very fine breakfast before me. . . . an omelette and a steaming cup of coffee. I picked up my fork at that moment the W's struck. The veil of static had been dramatically rent asunder.—"VQ9HBA. VQ9HBA. . .from. . .W8FGX—VQ9FGX from W9RK—VQ9HBA this is W1FH—VQ9HBA his is. . . . ." "W's this is VQ9HBA on Aldabra. W's move up 10 kc on the band *please*. Sorry Ws. can't talk to everyone at once." VQ9HBA. . .VQ9HBA. . . VQ9HBA from W5PSB—*please*." "W5PSB from VQ9HBA. . .Good morning Old Man. Ur RST 589 in Aldabra. Fine business. Name is Harvey. . . ." " VQ9HBA from W5PSB. . . Many thanks Harvey. Psd. to meet you. Name here is Pat and QTH in Texas. UR putting in a fine signal here Harvey—5 7 & 9. Will not hold U. Many stations calling U. 73s. . . ."

At 0432 GMT the static closed in solid again, shutting out all the W's completely. But by then I had a long list of W's worked before me. My untouched breakfast lay stone cold on the table.

After this I took a walk to the settlement. I thought I would boast of my achievement to Gus. But on arrival at the Guest House I found its inmate stretched out on his bunk asleep. His mouth sagging open. Too tired to snore. Exhausted. No doubt, all night, he had been over chasing W's. Three small Aldabra kid goats romped around the polished floor. But Gus slept on. Over there the table with the sets—now abandoned. Its white cloth powered grey with the ash of countless cigarettes. A litter of wind blown paper on the floor.

Monday 21st. of May. A light Southerly breeze. And at 0900 hours ship's time we shook hands with the Administrator. We set the full mainsail and the genoa. We proceeded Eastwards, and towards Mahe, along the northern shore of Aldabra.

Under the lee of the land the sea was calm and we made good progress until some distance the other side of the main pass. Here the wind headed us and forced us on an off shore course. But by mid-day the sea was still reasonable enough to allow us to take our lunch in comfort. It was the last time that Gus was to appear at lunch—or any other meal—for many days to come. In so far as Gus was concerned, the voyage from this point onwards was completely peaceful, for he went into almost total hibernation, being even incapable of pulling the cord of our little 'Frankenstein Monster'— 115 volt ac generator.

1400 hours and change of watch. Log 22.5 miles. Wind SSE force 4. Weather fine but sky hazy. Course 075 degrees true which—allowing for current and leeway—should just have allowed us to fetch Alphonse Island, now 390 miles away.

My watch below. I decided to turn in and to snatch some sleep while the going was good. In the forecastle the motion was considerable. From my bunk, on the weather side, one could hear the resounding blows of the seas, just by one's ear, against the steel plates of the hull. As all the ports were closed the atmosphere soon became oppresive, and moreover, the air was charged with the nauseating fumes of benzine coming from, I believe, an imperfectly sealed tin stowed just below my bunk. So I

was soon in a similar state to Gus, and left that forecastle hastily, never there to return for the rest of the voyage.

1900 hours. Log 47 miles. The breeze had freshened considerably so Ben double reefed the mainsail and shifted foresails, making all snug for the night. It was well that he did so for later during my watch it breezed up with heavy squalls from the SSE, and the vessel—even under that canvas—was just about as much as I could manage. And one is always reluctant to call out the watch below unless things seem to be getting out of hand. The crew of a small vessel on 'the great waters' need all the sleep that they can get, for they never know when wild weather may demand many hours of vigil.

We had already decided to work 4 hour watches during the hours of darkness, and 5 hour watches during daylight. So at 2300 hours I handed over to Ben. By then the wind had increased to about force 5 or 6 and was still from the SSE. The vessel was sailing very fast and the log read 69 miles.

My watch below, but as I was unable to sleep in the forecastle, I had to improvise a bunk on the saloon floor. A lot of water was sloshing about there. And every now and then heavy spray would sweep the coachroof above and then, water dripping from the skylight, would find its way to Gus or to me. At about 0200 hours, Tuesday May 22nd., the vessel was thrown violently almost on to her beam ends. Torrents of water seemed to sweep over the cabin top. There was a series of crashes and thuds, as an avalanche of cushions and heavy objects sailed from the weather bunk and past my head. Switching on the light revealed a state of dreadful disorder. Amidst a litter of sodden books and wet cushions were seen Gus's Transmitter and Receiver, both upside down in the bilge water. As though this were not enough, Gus's brand new camera in its smart yellow leather case floated amidst the debris. It is hardly an exageration to say, that we passed a most miserable watch below and that we lost a lot of sleep.

0300 hours. Unfortunately my watch again on deck. The weather had obviously deteriorated and so Ben pulled down the third reef and took in the small jib. The vessel at once became easier on the helm but she was still sailing fast. A very big swell was rolling in from the SE. The wind was gusty and at times force 6 or more. Low scud raced across the sky, and shutting out the moon and the stars, cast grim shadows across the rough sea. To the South'ard, against a background of storm cloud, stood a perfect lunar rainbow. And this was not a good sign.

0700 hours. Log 105 miles. Speed about 5 knots. A high sea and a strong wind still from the SSE. A typical, sullen, overcast, monsoon sky of the kind which makes all observations most difficult. I was very tired but held on while Ben prepared our breakfast. How does Ben manage to keep his pots and pans on that reeling stove below, and at the same time maintain his balance? All this would try even the most skillful juggler.

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first time, a little black bird with a white breast gliding around in the valleys between the wave crests. A storm petrel, though not the true storm petrel of the Atlantic. These birds like to follow ships and are believed by seamen to be the harbingers of bad weather. They are also known as 'Mother Carey's Chickens' though I know not why. I recalled then that a local 'sea cook' on seeing one of these used to work himself up into quite a frenzy. "Mauvais oiseau: tue-lee: shoot the B'. Petrel is a diminuative of 'Peter', (St. Peter), and this genus was given the name because of the habit of fluttering their feet almost on the surface of the water, and thus giving the impression of 'walking on water'. (Matthew XIV -29).

Dawn, Wednesday, May 23rd. The vessel was under storm jib and trisail. The sea was as high and dangerous as I have ever seen from the deck of such a small boat. The force of the wind I estimated at 8, (34 to 40 knots). An incredable confusion of monstrously steep seas with foaming, toppling, crests advancing upon us inexorably, and then, almost miraculously it seemed, passing harmlessly under the hull to reappear to leeward with a roar of riven water, just near my elbow where it rested on the cockpit combing. Brave little ship behaving magnificently! These seas were running from several directions. Occasionally two huge crests would charge each other from opposite points of the compass, and then crash down in a welter of broken water, making a noise like a ton of falling masonry. Now and again the top of a crest would smash down on the vessel's coachroof, drenching the helmsman in sheets of flying spindrift, and forcing its way even under the battened-down skylight. On these occasions muffled curses were audible from below as jets of water spouted from the skylight frame and on to Gus's bunk.

"Gus: any water down there?" "Hey: you don't have to tell me." "One of them lands right on my bunk about once every half hour." "Say: you could time your watch by 'em." "Hey: when I get on with them W Boys next time, I'll tell them W Boys if they want to make another DXpedition to the Aldabras they can have all them islands to themselves, so far as I'm concerned." "They won't be finding me there, *No* sir."

The violent motion: the stinging sheets of spray: the sopping cloths: lack of sleep: irregular meals: the menace of the breaking seas: even the dismal whine of the wind in the rigging—all this tends to exhaust a hard tried crew. Not a question of whether a small vessel will, or will not, survive but rather a matter of whether the crew will, or will not, endure.

1530 hours. Still blowing very hard but from the South. Aldabra 210 weary miles astern. We had been set back 25 miles by current. Now brilliant sunshine had broken through the dull sky at last. The sea though still big was more regular. Great seas of deep sapphire blue with almost everywhere the intense white of breaking crests. We hoped that the worst of the storm was over. But the storm petrel was still with us.

The storm petrel did not lie. We had not yet finished with this wild weather. But although it blew hard again that night and early the next morning, we did not encounter again, during the remainder of the voyage, such dangerous seas as we had experienced on the morning of the 23rd of May.

Noon on Saturday 26th of May. Position—Boudeuse Cay in the Southern Amirantes now 65 miles, bearing 52 degrees true. We had been unable to fetch Alphonse; we had been set too far to the West'ard by unfavorable currents. But there was now a marked change in the weather. Gone the blustering, bullying, Southerly gale. But instead, a bright sun smiled down on a blue and sparkling sea. "Hey Gus: how about some eats to-day?"

We're back on the good old corned beef again. Ben fries it up with onions and potatos. Corned beef is the best canned meat of all—say what you like! They've never bettered it. Tinned chicken; tinned ham—you can keep 'em. They're expensive and they all lose their taste with canning. Whereas, as Gus now says, "Good old corned beef; why it tastes of good old corned beef!"

Dawn on Sunday, May 27th, we passed quite close to Etoile Cay and set a course for Poivre Island which we sighted around about 1000 hours. Here we trolled and caught a fine big bonita. Then Ben cut half of this into steaks and fried them. But the chipped potatos —the last of our potatos—evaded him. At the last moment they leapt clear of the stove and landed in the bilge. Never mind; land in sight and Gus is on the feed. So three men and a black cat finished 7 lbs of fish and a packet of Ryevita. Fingers were used for forks.

That evening we anchored in 2 fathoms of calm water under the lee of DesRoches Island. The vessel was unbelievably motionless. We found it hard to sleep. But the next morning we were awake early and set sail for Mahe, where we arived after an uneventful voyage, 32 hours later.

In summing up the return voyage from Aldabra, Gus says, "This sure was no roast chicken trip."

W2NSD/1

IoAR Tour, 1963

Part II

In the January issue of 73 our group of 73 hams, wives and blissfully ignorant tour director, me, sampled the delights of London and Paris.

When we arrived at our hotel in Geneva I was at a distinct disadvantage. All arrangements had been made by mail and since all my letters were in English and all of the hotel letters in French, there was obviously room for mishap. I was not disappointed. No one at the hotel spoke any English and out of our group Virginia and I were the only ones with even a smattering of French.

I could see we were in trouble when I realized that I was going to have to go it alone as interpreter. I soon realized how deep the trouble was when I found that my request for 37 double rooms had been interpreted as a request for quarters for 73 people. They had the room alright. There was one room for six, two for five, six rooms for four, nine rooms for three, two rooms for two and two rooms for one. Yep, it added up to 73 alright. I looked up at the 72 hopeful faces waiting for me to hand out room keys, none of them aware of the problem or that I had just been turned to stone.

Mack W2BIB of Hammarlund, Domenico HVICN of Radio Vatican, and Major Creminizzi of the Italian Air Forces enjoying the show at a Paris night club along with Supreme Court Justice Earl Warren (background). Photo by W2JXH.

Pausing only to take a quick wistful look a the hotel's confirmation of the 37 double room I got to work. After considerable mutual frus tration I was able to communicate to the hote keeper that we needed some more rooms. A fev phone calls lined them up and eventually I sa back with everyone assigned. We were split up into five neighboring hotels, but we all had rooms.

Geneva under normal conditions doesn't have a lot of hotel space. We managed to ar rive in the middle of the disarmament talks and the Space Communications Conference as well as a few lesser known conferences. Geneva was just about full. We were really very fortunate to be able to arrive 73 strong and get rooms at such a time. The Swiss are masters at hotel-keeping and their government tourist office had made the arrangements for me.

Virginia and I walked around the corner, bags in hand, to the hotel where we were staying. We struggled up the winding staircase to the first floor and were quickly shown our room. It looked OK. Then the woman took us out and showed us the toilet. Hmmm. I asked about the bath. "Pas de bain." That's right, the hotel did not have one single bath. . . .not one! It was too late to move on by this time, so we unpacked and went out for some dinner. You can bet that I called the hotel where I usually stay in Geneva and asked if they could possibly make room for an old customer. Thank heaven they did. We moved the next morning.

On our last trip to Switzerland Virginia and I had made it a point to follow the instructions in the book, Europe on $5 a Day, and try the Fondue Bourguignonne. It was so wonderful that we were on the lookout for it again and found it right across the street from our hotel. It was still marvelous. More and more is appearing about this dish in American magazines, the latest being in the January Playboy, page 113.

As we left the restaurant and were walking

Stu Meyer W2GHK of Hammarlund and Bob Waters of Waters Manufacturing at 4U1ITU.

back to the hotel we stopped in a grocery store to buy one of the delicious Swiss sausages. We were just leaving as the store was closing and there, pounding on the entrance door, was one of our group. He was shouting, "Let me in, let me in. Let me in this restaurant so I can get some dinner. What's the matter with you, you don't talk English!" One of the clerks was pointing to the sign on the door showing that they were closed, but our boy was too busy pounding. We stopped him and eventually convinced him that this was a closed grocery, not a restaurant.

The next day we had set aside for shopping. Geneva is one of the best shopping cities in the world. After moving to our new hotel we walked over one of the bridges and spent the rest of the day changing dollars into Swiss Francs and spending them. We bought a cute toy donkey for Tully to ride, a bourguignonne set, all sorts of other knick-knacks and a suitcase to pack them in. We kept bumping into 73 tourers with arms loaded with bundles.

That night we went out for dinner with George Jacobs and Chuck Schauers, who used to write for me in my CQ days, and Bill Orr, who still, I think, writes for me. We had a wonderful reunion, argued a bit over incentive licensing, had another fondue bourguignonne, and perhaps a bit too much Swiss wine.

The International Hamfest started the next morning and most of us were out there bright and early so that we wouldn't miss the technical talks and the chance of operating 4U1ITU. I was surprised to find a lot of old friends and acquaintances there for the hamfest.

Though there was a good turnout from several countries for the hamfest, our 73 people put the Americans in the large majority. We all enjoyed John Huntoon's attempts to ignore this and his careful avoidance of recog-

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Domenico HV1CN and unidentified American publisher at the Vatican ham station.

nizing the Institute of Amateur Radio, the sponsor of our trip. The ARRL Executive Committee had already sneaked their petition into the FCC at this time and I'm afraid I twitted him just a bit about it.

That evening a grand banquet was held. It was a fine meal and we all had a good time. The wine flowed like wine and many of our trippers floated back to their hotels afterward. I was enjoying the party until the toastmaster started thanking everyone who was involved with the hamfest individually and had worked his way through everyone from the ARRL, the RSGB, all other countries, clubs, the local amateurs, the International Amateur Radio Club officers, and on down to the table waiters without mentioning me. I felt like two cents and had to leave so no one would see how hurt I was. There's nothing like too much ego, eh?

The next morning we were off to Rome. Caravelle again, via Alitalia this time. No problems this time. We were met at the airport by a bus and a representative of the hotel. The hotel was splendid. We all had dinners near the hotel and got to bed early so we wouldn't be tired the next morning on our visit to the Vatican.

About 8 AM Father Contini caught me in the middle of breakfast and shortly thereafter we were on our way. Through arrangements made by Hammarlund, Father Contini took us on a guided tour of the Vatican, including HV1CN and the Vatican Radio studios, the famous garden, and many other interesting behind-the-scenes places. I didn't tell Father Contini at the time, but our one Catholic couple were the only ones that overslept that morning and they missed the tour. We went to the Vatican from the hotel by trolly. This was an experience too, for the trollies were more crowded than a New York subway at rush hour. Only our Goat Boy managed to get lost. He was looking the wrong way when we all got off. You haven't forgotten GB yet, have you?

Ae we finished the tour the Ecumenical Council was breaking for lunch and there were cardinals and bishops everywhere. Colorful

Virginia and I took a taxi to the Trevi fountain (three coins in the) and had lunch in a small restaurant facing it. We then walked all over Rome looking for something to buy . . . anything. We tried again all the next day. Virginia began to get desperate. She left no store unpicked over. Nothing. I'm sure I'll never get her to Rome again. We looked over a few ruins, finally figuring out that their system was to use something as long as possible and then designate it an official ruin.

We were all up early again the next morning, for this was our day for an audience with the Pope. Even the Catholics were up. We set out early and arrived at the Vatican about 8:30. Father Contini was right there and showed us where to wait while he made further arrangements. Soon more people began to arrive and by 11:00 we were lost in a wild mass of about 8000 people. Father Contini finally arrived, but there was no way that he could convince the policeman at the gate to open it and let us in. A little while later they did crack the gate and let people trickle in . . . they just about killed each other trying to jam through the gate. Along about 11:30 I made it through. Fortunately Father Contini had taken Virginia and four of our Catholic members of the tour with him when he left us at 8:30 in order to get them a front seat at the audience. When I got through the gate I followed the mob and at length arrived at another gate with several thousand people trying to jam through. Since I had the only pass for our entire group I tried hard to get through there as quickly as possible so I could make whatever arrangements had to be made inside.

I worked my way around the edge of this mob scene and found myself through the gate and walking up about a quarter mile of stairs. Most of the people were going into a large room to my left . . . some were going to the right. I looked in the left hand room and saw about 1000 people in there already, probably half full. I went to the right and discovered a huge basilica. One of the guards asked for my pass and indicated a roped off square where our group was supposed to stand. I then went back to guide the tour the right way. After 15 minutes had passed and no one had shown up I hiked back down the stairs

looking for everyone. Eventually all of the people out in the yard had been admitted and not one of our group was anywhere to be seen. I couldn't understand what had happened. They had all disappeared. I found out later that the crowd had been diverted for a while into another basilica and that almost all of them ended up in there. The Pope went from one room to another, having a short service in each.

After wearily climbing back to our appointed spot I found that three of four of the tour had made that room. Suddenly Father Contini appeared and grabbed my arm, dragging me down the aisle to the front of the basilica, swinging his heavy rosary at the guards trying to stop us. There, in the second row was Virginia and our four Catholics! Everybody shoved over a little and I sat down right on the aisle. The only ones in front of us were the Admiral of the Italian Navy, his wife and mother, and a couple more women all dressed in black. One of the bishops there said that there were about 6000 in our room. Easily.

Along about two and a half hours later there was a rustle and the Pope arrived, carried on a chair by eight enormous Swiss Guards. There were more guards on each side with large battle axes with which they fought off the people trying to touch the Pope. As the Pope's chair was set down right beside me I managed a one finger touch before being crushed between the people pushing behind me and the guards in front. Now I see why they hire seven foot giants to protect the Pope.

The Pope welcomed the various groups present, including the 73 radio amateurs from the United States (muted cheers from those of us that made it). He read a short mesage in several languages and got ready to go. Well, I want to tell you that everyone was ready for him this time. As he leaped to the chair the Swiss guards were almost overpowered by completely insane women, screaming and

W2NSD/1 and XYL at Vatican City.

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trying with all their strength to touch him. They climbed over each other, knocked over chairs, benches, just about mashed a half dozen cardinals, and were aware of nothing except "papa" as they clawed their way toward him If the guards hadn't whisked him out of there at top speed he would have been killed.

It happens every Wednesday.

(W2NSD from page 4)

past director or any of the more influential manufacturers. There has been virtually no way to write about these inside matters down through the years due to the intense devotion given by many amateurs to the ARRL. Now that RM-499 has shocked tens of thousands of ARRL'ers to where they are interested in finding out what happened, it may be possible to view the League with enough detatchment to attempt to cure some of its ills.

With this background you may understand better why I feel it is so important to have the Institute of Amateur Radio start immediately to prepare for the Geneva Conference. It is of immediate importance for us to open an information office in Washington and make sure that by the time of the conference our government is completely convinced that amateur radio is of primary importance and that it must be protected at all costs. We can do it. . . .with your help. Join the Institute.

Suggestions

There will be plenty to discuss at the National Convention in New York City in August, though this may be too soon to have worked out any concrete changes in the constitution and by-laws.

Some suggestions that I might make are: (1) Bring a halt to those secret pre-board directors meetings. This will help to cut out the under-the-table maneuvering. (2) Report all of the board meetings in the minutes published in QST. This may help stop this "unanimous" voting baloney we've been subjected to of late. (3) How about having the membership vote directly for the president and vice-president of the League once every four years. This should not only bring us better officers, but might greatly increase the interest of the average ham in the League. (4) Directors terms should be four years, with one half of them being elected each two years. This would give continuity to the League and would permit directors to wield more influence. (5) Have the board meet two or three times a year instead on just once. This will give the directors a greater say in the running of the League. (6) Require a two-thirds vote of the directors before any specific proposals can be sent to the FCC. This would prevent diasters like RM-499. (7) Complete report of all business transacted at executive committee meetings should be sent to all directors. (8) a referendum of the members be made before any proposals be sent to the FCC recommending the removal of operating privileges from any class of license. (9) Separate the executive branches of the ARRL from QST. This would permit the editor of QST to devote more time to improving the magazine and attending to the other publications and also permit the League General Manager to better manage the many activities of the League. (10) League mem-

(Turn to page 80)

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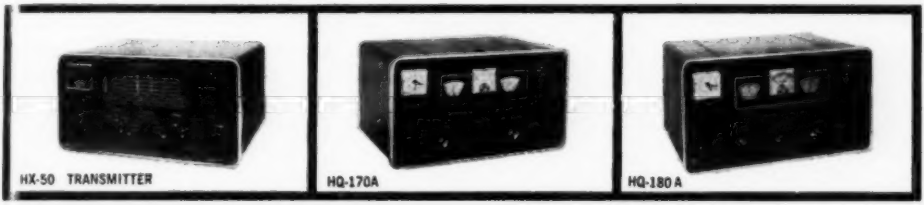

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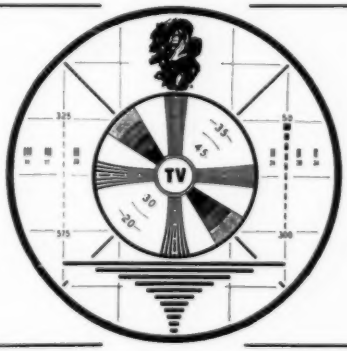

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(W2NSD from page 78)

bers should be entitled to know about League expenditures, particularly salaries, retirement payments and business expenses incurred by officers. The full financial report of the League should be published in QST each year. (11) Editorials in QST should be signed so that members know where responsibility lies for statements made. (12) There should be some attempt made to have QST reflect both sides of controversial issues rather than just the League viewpoint. (13) The ARRL should return to the previous system of having a National Convention every year. (14) The League should work together with the Institute of Amateur Radio toward the long range strength of amateur radio.

Cover Ballot

This is being written just a little over a week after the February issue of 73 was delivered to most subscribers, so we have only fragmentary results so far. Since the percentages settled down early in the count and have not varied significantly since, I suspect that we are quite close to the final percentages that will result from the pool.

I understand from a visitor to League HQ that, "They'll be lucky if they get 500 ballots." Well, we passed 3000 ballots today and they are still pouring in with every mail. I realize that there is bound to be some hysteria from the general Connecticut area and I think we are prepared for it. We are being excruciatingly careful to keep every single ballot that has come in. They will be kept available for recount by anyone who is willing to take the trouble. All of the votes in favor of RM-499 are kept in a small box so they can be located as easily as possible. I figure that there will be very little grumbling over opposed votes. I suggest that some of the fellows who voted for 499 let the ARRL know about their vote so a spot check can be made.

OK, let's see what percentages we have so far. The percentage of ballots opposed to RM-499 has been running between 80-85%, settling down on 83.5%. Naturally you will argue that this is all OK for 73 readers, who might be logically opposed to 499 due to preconditioning from my editorials. One might expect that if we just ran a percentage on ARRL members that answered the ballot we would find a number closer to the 50% claimed by the ARRL. Well, when we look at the ballots sent in by ARRL members and run a percentage on them alone we come up in the same ball park: 81.5% opposed to 499! It is no wonder

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"CBS" 2N1433, 2N1434, 2N1435, etc. Others.
2N442, "Tungsol" 100 watt, 15 amp. ..... @ $1.25 ea.
2N443, "Tungsol" 100 watt, 13 amp. ..... $1.25 ea.
2N1358, "Tungsol" and Motorola ..... $1.25 ea.
2N242 "Tungsol" ..... $1.00 ea.
2N277 "Tungsol" ..... $1.25 ea.
2N278 "Tungsol" ..... $1.25 ea.
2N147 Texas Instru. I.F., NPN ..... @ 4/$1.00
Planar Transistors, NPN ..... $.50 ea.
Dynaquads Transistors ..... $.50 ea.
2N1208 NPN "Transitron" Silicon, 12 MC, 45 watt 2 amp. (Stud) transistor ..... $2.50 ea.
1N217 "Hoffman" silicon rectifier ..... $.20 ea.
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Zener Diode—Silicon, 12 volt, 1 amp. ..... $1.00 ea.
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Zener Diode—Silicon, 1½ volt, Sv3372 Transitron @ 4/$1.00
2N599 PNP—power miniature "Philco" 250 ma. ..... $.50 ea.
2N600 PNP—power miniature "Philco" 750 ma. 8MC $.50 ea.
GE Bulb No. 159 with socket and wire leads, new type $.35 set
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1N537-1N539 Tophat rectifier silicon, Raytheon etc. ..... $.30 ea.
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Resistors 5% only, A.B., IRC., Stackpole, etc 20/$1.00 ½ wa.
Resistors 5% only ¼ & 1/3 watt, as above ..... 15/$1.00
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Dual 70 volt 70 volt Sec., 115 volt, 60 cy Pri. $1.50
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"Philco" HF PNP transistors ..... 6/$1.00

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that there has been nothing more in the editorials of QST recently. A great many of those 81.5% are pretty furious too. Though we had no place on the ballot to indicate that the voter was quitting the ARRL we found that 18.5% of the ARRL members took the trouble to make a note to this effect.

With such a high percentage indicating that they do not intend to renew their ARRL membership, I wonder just what inroads have been made into the League Total so far. 18.5 percent of 84,000 would be a loss of over 15,000 members.

Geneva: 1965!

Our government agencies are being alerted that the dreaded Geneva Conference is now expected to be held in 1965 instead of the hoped for 1968. This is bad news for the U. S., which managed, many years ago, to come off with an enormous share of the spectrum and has been adroitly staving off the day of reckoning (wreckoning?).

What does this mean to amateur radio? This means that time is running out much faster than we thought. We have just about a year to get our own government behind us and impress upon foreign countries the value of a strong amateur "service." Are we going to just give up or are we going to put up a fight?

We won't have any proof of the danger facing amateur radio until the proposals are submitted by the various countries before the conference. Last time a great many countries proposed cuts in our bands, with some of them being extreme. France wanted to use our ten meter band on a shared basis, provided the amateurs did not create any interference to their services. Picture that one. India thought bands 20 kc wide were really adequate for us. 75 and 80 meters was badly wanted for Central and South American point-to-point business and government communications. International broadcasting wanted more frequencies near our 20 meter band.

To look on the dark side, we could lose 20 meters, at least half of 40 meters, be cut back seriously and reduced in power on 80 meters, and have to share ten meters or maybe even lose part of it. On the bright side, we could hold our own. Realistically I would expect that we might lose 50 kc of 20 meters, 150 kc of 40 meters, and 250 kc of 80 meters, unless we really put up a battle.

The battle is up to you. Is ham radio worth any effort or expense to you? Is the enjoyment worth anything? How about protecting your investment in equipment? The Institute of Amateur Radio has a concrete conservative plan for meeting the coming emergency with positive action. This plan cannot be put into effect without your support. Do you think this is important enough to back?

How can we fight? The ways that seem most practical are 1) Get our own government behind us solidly. Amateur radio provides a wide variety of public services, it is invaluable in time of emergency, and is a training ground for the electronics industry (which has benefitted immeasurably as a result). We have to tell this story to every Senator, Representative, and public official that can possibly affect our future. No such program is now being carried

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on. Right now the major source of information about amateur radio is newspaper articles and TVI complaints from constituents. Great, eh?

2) Impress upon foreign governments the value of a strong amateur service to their electronics industry, tourist trade, ability to face emergencies, etc. Amateur radio could be a great thing for newer countries if they only knew about it. No one is telling them. Countries like Burundi, Cameroon, Chad, Cyprus, Dahomey, Gabon, Ghana, Ivory Coast, Kuwait, Malagasy, Mali, Mauritania, Niger, Rwanda, Senegal, and Somali, all of which have a vote equal to ours and are new members of the I.T.U., can put us out of business. These countries need frequencies badly for short wave broadcasting, business radio and military use. If we can't convince them that ham radio is going to be invaluable to them then we'd better have Uncle Sammy behind us completely convinced and holding the biggest stick he's got.

3) There is much to be gained in cleaning up our own house which has gotten pretty messy after all these years of neglect. If you go for my OPU system and crack down on bad signals and bad operating we will be able to face anyone with pride. A little bit of dedication to the technical side of ham radio by everyone and we won't have to worry about do-gooders calling for stiff government regulation.

Points one and two are not being tackled by the ARRL, nor can they do much along these lines without a complete reconstruction of the League due to the limitation of the $5 dues setup. This means that either the Institute of Amateur Radio works on these problems or else no one does. Is ham radio *next year* important enough for you to send in your $10 to the Institute so we can move ahead?

There is only one way that all this can happen. This means that *you* are elected. Send your membership in to the Institute of Amateur Radio right now and put the pressure on members of your local club and fellows you work on the air to join quickly.

This is not a big deal to get people to subscribe to 73 . . . the magazine will stand or fall on its own merits and is not tied in with the work of the Institute except that most of the Institute work is being shoved off on the 73 staffers.

Your $10 to the Institute will bring you one of the nicest membership cards you've ever seen plus a Founding Member Certificate for your shack wall. You'll also get reports on the progress of the Institute.

Take a good look at your ham station . . . is it worth protecting?

Questions

Several fellows have written in asking why the Institute doesn't try to compete with the League. This is simple . . . we need a strong constructive approach to our problems, not one which will tend to further tear apart the fabric of our hobby. I'll admit that it is difficult not to be constantly critical of the League when they devote an editorial that should have explained why they pulled the prize boner of their history to the startling subject: "The Amateur is Loyal . . . He owes his amateur radio to the American Radio Relay League and he offers it his unswerving loyalty." Good grief.

I have a question. It is going to be extremely important that we have a darned good man representing us in Washington. Have any of you any suggestions for a ham that could handle this critical job? He's going to have to be someone that knows the answers, will make it his business to get around and see everyone he can and keep his thumb on the pulse of the Capitol. I don't know how much we'll be able to pay yet . . . that depends upon how many amateurs feel their hobby is important enough to invest in it. It does seem to me that this is just a little more important than a building fund for a building which may become a memorial to our departed hobby. Well, anyway, let me know who you think might be able to do a good job for us all.

FCC Action Expected

My files are bulging with copies of letters from the League answering irate members who have written complaining about the submission of RM-499. From the sheer volume and the wide range of names on these letters it would seem that the entire headquarters staff has been trying to keep up with the avalanche of vituperative mail. The answering letters all read about the same and the main point raised is that RM-499 is just one point in the League's ten point program for improving amateur radio. Holy Smokes . . . you mean we have nine more shocks like that coming at us?

I understand that there is a good chance that we may get our cliff-hanging over with this month when the FCC announces a docket of proposed rule making. We'll then have 90 days to file our comments on this docket instead of the usual 60, I believe. Naturally I hope that the FCC will follow their precedents and propose a solution that does not take away operating privileges from anyone.

SPECIALS . . . . . For The Month

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330B Distortion Analyzer $285.00 • 205AG Audio Generator $325.00 • 130B 'Scope $350.00 • 540B Transfer Oscillator $600.00 • 212A Pulse Generator $350.00 • 430C Power Meter $165.00 • **302A** Wave Analyzer $175.00 • **683C** 2 to 4 KMC Sweep Oscillator like new $199.00 • 650 Test Oscillator $300.00 • 410B VTVM $150.00 • 202A Function Generator $250.00 • H.P. 430C Power Meter $165.00 • Ad-Yu Precision Phase Angle Voltmeter #405L $450.00 • Boonton 202B, AM-FM Signal Generator 54-216 MC $375.00

SIGNAL GENERATORS

Ballentine 300 VTVM . . . $99.00 • Hewlett Packard 400C VTVM $115.00 • Hewlett Packard 430B Power Mtr . . . $120.00 • Hewlett Packard 526B Plug-in . . . $110.00 • Hewlett Packard 526C Plug-in $125.00 • Hewlett Packard 200c Audio Generator . . . $75.00 • TS-382D/U Audio Gen. 20cps to 200kc $295.00 • TS-268D/U Extal Rectifier Test Set . . $17.50 • TS-375A/U VTVM . . $65.00

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Dumont 304AR Scopes $195.00 • Dumont 256D Scopes $90.00 • Dumont 324 Scopes $245.00 • Boonton 212A Glide Scope Tester L/N $375.00

SCOPES

T-179/ART-26 HAM TV Transm. w/All Tubes $59.50 • General Radio 200B Variac New $7.50 • PL-259, SO239, M-359-UG-100A/U New Any 3 . . $1.00

RECEIVERS

SP-600 JX—540kc-54mc/s . . . $450.00 • R-390 Digital Job 500-32mc/s . . $790.00 • URR-13 225 to 400mc/s . . . $320.00 • CR-10 RCA Fixed Freq. $75.00 • Wilcox F-3 Fixed Freq. . . . $65.00

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BC-221 Freq. Mtr 125kc to 20mc/s . . $70.00 • TS-174/U Freq. Mtr 20mc to 250mc/s . . $150.00 • TS-175A/U Freq. Mtr 85mc to 1000mc/s . . . $135.00 • AN/URM-25D Sig. Gen 10kc to 50mc $395.00

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One of the saddest documents to come from the ARRL in recent days is their rebuttal to the FCC in answer to all of the questions raised about RM-499. After listing several other petitions before the FCC they relinquished even the pretense that the ARRL is trying to provide leadership for us by turning the whole problem (which they had raised) over to the FCC by saying, "Firm guidance and leadership by the Commission at this time is essential."

Institute Tours

It has become increasingly obvious that we just aren't going to have the time to adequately set up arrangements for Institute tours this fall due to the immense amount of work involved in establishing our Washington information office and starting information going to foreign countries.

International friendship is just going to have to wait until next year while we do everything we can to keep ham radio alive so we have something to be friendly about.

New Hampshire Primaries

Normally New Hampshire doesn't make the news very much, but in election year the New Hampshire primaries, being the first in the

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country, bring lots of candidates and newsmen. Just in the last few days we've had visits from both Rockefeller and Goldwater and had a chance to compare them. I tried to put aside my distaste over the "Hams for Good Government" debacle wherein New York State amateurs were barraged with literature on Rocky sent by the same fellows who managed the license plate call letters, making the whole works look like a political deal.

Here in Peterborough we were faced with Rockefeller attacking Goldwater rather than explaining his own policies, followed by a no question period in which he shook a few hands and rushed away. I did get my elbow grabbed and was fella'd.

Goldwater made a tremendously better impression on everyone. He gave a short talk and then answered all questions. He refused to say anything against anyone, preferring to acquaint us with his positive views. I had a short talk with him afterwards and he remarked that everywhere he had gone in New Hampshire he had found hams in profusion. He drove the politicians who were trying to keep him on schedule to distraction by talking ham radio with members of our staff. I suspect that one of Barry's most serious problems is going to be his ignoring of politics and speaking out with facts rather than just telling everyone what they want to hear. Our problems would be unbelievably simplified if we had a ham for president.

New York RTTY Dinner

The RTTY gang will meet once again during the IEEE Show. The dinner is scheduled for Monday, March 23, at the Patricia Murphy Restaurant, 260 Madison Avenue, New York City. A la carte cocktails and informal rag chewing commences at 5:30 P.M. with the dinner at 7:00 P.M., followed by some excellent technical discussions. For reservations send a check in the amount of $6.50 each to Elston H. Swanson, W2PEE, Instruments For Industry, Inc., 101 New South Road Hicksville, New York 11802.

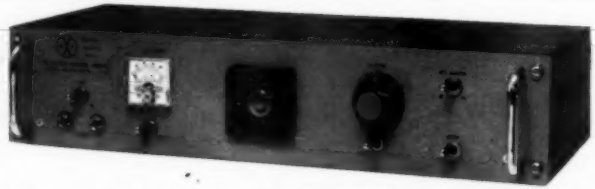
Ten More Rooms

When we moved into our headquarters about two years ago we couldn't even imagine that things would get cramped in a 37 room house. That was before the offset press and its resultant offset press room, the process camera for making the offset negatives brought on the camera room and dark room (the camera is over six feet long), then there is the studio room where we take our 5 x 7 pictures of equipment, the ham shack, the test lab, the metal working shop, the addressing room where our huge addressing machine grumbles away . . . and on and on.

Last spring we added a five room house way up on the high slopes of Mount Monadnock as a summer hamshack, VHF location to end all VHF locations, and experimental lab for Ham-TV, RTTY, wide band FM, etc.

Our latest addition is a ten room house not far from our headquarters building which will give us a bit more elbow room.

. . . Wayne



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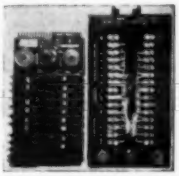

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TS-173 Covers 90-450 MC with power supply 125.00
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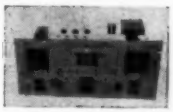

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New Tube

GE is adding to its Compactron line. The newest, the 6T9, is a combination of voltage amplifier triode (like half of a 12AX7) and a power amplifier pentode (like the 6AQ5, but powerfuller) which will give five watts power output. This one should be fine for small rigs.

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More Comments on RM-499

Dear OM:

I am considerably puzzled by a quotation attributed to you in the current issue of *73* Magazine. The reason is that it seems diametrically opposed to the viewpoint you expressed in your letter to me last June. In that letter you offered "a resounding vote of confidence to the Board for its incentive licensing proposal." Do you care to outline just what it is that has changed your mind so completely?

John Huntoon
General Manager, ARRL

Dear Mr. Huntoon:

Yes, sir, I do care to outline the things that have influenced my thinking about the ARRL in recent month; matter of fact, I'll do better than an outline — I'll set it down in detail.

Frankly, I don't think my position has deviated much from the thoughts set down in my letter to you dated 27 June 1963, and paraphrazed on page 85 of September QST; I am still solidly in favor of a return to Incentive Licensing and the Board's overall program as outlined on page 10 of QST for June. Remembering that at the time my letter was written no one outside of League headquarters knew the details of your incentive plan, I then thought your position was reasonable, fairly logical, supported by the majority of amateurs,a nd opposed by the usual vocal minority.

After learning the details of your plan to re-establish restricted voice bands, I found myself in complete disagreement with you, but willing to go along if there were serious reasons justifying the adoption of your plan. My position is still the same today — I think other plans I've heard would make more sense, but, none of this is my main concern. What really hurt was the chaos and bitter, passionate hatred your handling of the incentive issue fostered; the current state of affairs is unnecessary, seriously harmful, and the product of your miscalculations and errors. My letter to Wayne Green, quoted in his February Editorial, applied the adjectives "inept and mislead" to your efforts and I reaffirm that I seriously believe that judgment is correct, applied to the League as a whole, your activities of the past few months, in my opinion, cast serious doubt on the League's ability to effectively represent the Amateur body. Understand clearly, Mr. Huntoon, that my disagreement with your proposal is not the reason for my attitude toward the League; my condemnation of your method of handling this proposal is the reason for my severe criticism.

Take a look at what you've done to swing support behind you. Why was it necessary to spend so much time justifying the word "Incentive"? The precedent in FCC rules is clear; prior incentives were changed for cause, and can be changed again for reciprocal causes; why bring in a lot of nonsense about current trends, without accurately defining what those trends are, and, more to the point, without detailing just how your proposal is supposed to correct those trends. The word incentive is the best one word definition you'll ever find of the difference between the Free and Communist world; it is the reason why the technology of this country has been ahead of all others, and, correspondingly, the reason why we enjoy the highest standard of living in the world. Why try to enlarge on this; Mr. Hoover uses three pages in January QST trying to justify incentive, which needs his efforts not, then refuses to explain the reasoning behind the ARRL plan which most certainly does need his efforts. He doesn't mention its origin, or why the Board considers it superior to other, more palatable schemes; he pointedly avoids discussion of the probable effects of the plan, and the application to the solution of the problem at hand. He will not venture into the area which most needs his attention — why? A defense of Incentive Licensing is not the answer critics of the ARRL plan are looking for; can you really expect anything other than the general conclusion that your plan is indefensible?

Even Stalin could never equate incentive and force — what makes you think human nature has changed radically in ten years? Did you really expect that Amateurs would voluntarily relinquish privileges without being convinced of the need for doing so? To the problem of re-establishing incentive in our licensing structure, why is not the best solution one that recognizes the difference on emphasis in phone and CW now as opposed to what existed when the current frequency divisions were made? Why do you not propose, for instance, to split 80 and 40 meters evenly between phone and cw, and use the new 50 Kc phone segments thus created as the exclusive preserve of the Advanced Class Licensee? This plan, Mr. Huntoon, seems to achieve the end without hurting anyone — what's wrong with it? Why is it not better than yours which proposes to impose all sorts of restrictions? Quote from your June Editorial "and eventually to carry certain **additional** operating privileges." Quote from July Editorial — "the following misstatement — all General and Conditional Class Licensees will be restricted to CW operation." Deny that though you did, is this not substantially what you reversed field and proposed?

Let's put it another way — I own almost $3,000.00 worth of CW/SSB equipment; if I had been interested in CW only, I could have gotten by for less than one third of the cost. Quote from February Editorial "there is no way to avoid the fact . . . . . that these privileges must be withdrawn from Amateurs who currently have them under the basic amateur license." Mr. Huntoon, do you really expect me to accept this statement from you blindly, unquestioningly, when it is my $3,000.00 that is at stake here; do I not, at the very least, have the right to a full explanation of exactly why you claim your plan is the best? Am I supposed to willingly jeopardize my right to use my equipment without really understanding why I'm doing it? Am I not supposed to question the qualifications and credentials of an organization that arrives at answers other than the obvious?

It's almost possible to believe, Mr. Huntoon, that ARRL purposely created the bitter cleavage that currently divides Amateur ranks; one thing certain is that it is your handling of the incentive issue that is the basic cause of the chaotic conditions which surround us, and that you could have avoided most of it had you tried. Even if your plan is the best solution, why have you not taken more care to sell it to the Amateur fraternity? Why set things up so that attention is forcefully drawn to the division in our ranks? Particularly, why draw the Commission's attention to the hatred some elements of Hamdom feel for ARRL, without making a real effort to try to avoid it? Have you underestimated Amateurs in general, and overestimated your own standing and prestige in particular, and is this mistake not grave enough to be fatal to the League? Has your posture in front of the Commission as

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our spokesman been so damaged that ARRL is now a liability instead of an asset? Have you not effectively sawed in half that which you should have been bending every effort to cement together?

I don't pretend to have the answers to these questions, Mr. Huntoon, but they're going to have to be found, and in the near future. Based upon what has happened in allied fields, I believe it is imperative that we, ourselves, reduce thas problem to manageable proportions, and go to the FCC with a solution that has the support of a majority of amateurs, without the vitriol that is currently being sloshed around as if it were nectar.

You've produced a cleavage in the ranks, Mr. Huntoon, from which we will not shortly recover; you've weakened our defenses, rather than strengthened our armaments. If you can explain all this away; if you can answer your critics, fine — let's have at it and do away with the dissension that threatens our future potency. If you cannot weld the seams you've split, step aside and let someone else try.

The best and most illustrative description of your failure is, however, provided by the League's counsel, in the February QST. The last sentence in the second to the last paragraph in your reply comments reads as follows: "Firm guidance and leadership by the Commission at this time is essential." No, Mr. Hunton, you're wrong, dead wrong; firm guidance and leadership is what has been essential from ARRL and we're in the current hassle, with all its problematical ramifications simply because that which you now ask from the Committion has not been forthcoming from you. You're supposed to lead, guide, and direct, Mr. Huntoon; you're not supposed to divide and conquer. You've been rudely unhorsed in recent weeks, and you stand to be unfrocked in the near future unless you come down to earth and provide some answers and possibly some reappraisals.

Cordially,
Milt De Reyna, Jr. K4ZJF
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73 parts kits

In the interests of making home construction simpler for those readers with anemic junk boxes 73 has gathered together the parts required for building our less complicated projects. These kits are as complete as we can make them, containing good quality parts. Except where the chassis or case is integral to a unit we do not supply it. We will mention when we do supply a case or chassis. We do supply tubes, sockets, condensers, resistors, transformers, connectors, etc. The kits are kept in stock to the best of our ability, though sometimes the distributors who supply us delay us a bit.

TWO METER PREAMPLIFIER. Uses two 6CW4 nuvistors in a grounded grid input circuit (March '63 p8) and one 6CW4 nuvistor grounded grid output. Complete with power supply. Uses 50 volts on the plates for extraordinary noise figure. Full scale drilling template supplied.
W9DUT-1 ..... $18.50

15-20 METER NUVISTOR PREAMPLIFIER. Need more hop on these bands? This simple to build preamp will bring up those signals. This is particularly good for inexpensive and surplus receivers. See April '63 page 40
W6SFM-1 ..... $4.00

TRANSISTOR TRANSCEIVER. One of the most popular kits we've ever assembled is this six meter miniscule transistorized transceiver. Really works. Hundreds built. See page 8 in the May '63 issue. Five transistors.
K3NHI $25.00

CW MONITOR. Connects right across your key and gives you a tone for monitoring your bug. Page 44, June '63.
WA2WFW $4.25

TWOER MODIFICATION. Increase your selectivity considerably by installing a new triode 7587 nuvistor stage. This is our best selling kit to date. Everything you need for the modification is included. See June '63 page 56
K6JCN $6.50

SIX METER CONVERTER, DELUXE. 6EW6 low noise front end, 6U8 oscillator and mixer. Output is 10.7 mc (easy to change to suit your needs). This is a tunable converter with fixed frequency output, not the usual converter that requires you to tune the receiver. This helps considerably on eliminating interference from nearby high power stations. See page 8, July '63.
W9DUT-2 ..... $20.00

NOISE GENERATOR. Invaluable test instrument for tuning up rf stages, converters, etc., voltage regulated by a Zener diode. Kit includes even the battery and mini-box. See page 15, Aug. '63.
K9ONT $5.00

QRP TRANSMITTER. Have fun with this little one half watt CW rig on 40 meters. Uses any 40M surplus crystal. Kit supplies 154 tube and socket, condensers, resistors, coil, rf choke, terminal trip, etc. Runs from flashlight battery for filament and portable radio 67½ volt B-battery. See March '63 p22
W1MEL $6.00

CAST IRON BALUN. Eentsy balun using ferite core, covers 6-40 meters, will handle up to 20 watts, complete with cabinet, connectors, etc. See September 1963 page 8.
W4WKM-1 ..... $3.00

BOURBON S-METER. Much better than the usual Scotch S-meter. Here is an S-meter kit for those of you with receivers without S-meters. Includes tube, adjusting pot., socket, resistors, and meter. See September 1963 page 18.
W6TKA-2 ..... $6.50

TONE MODULATED CRYSTAL STANDARD. Uses one tube and one mc crystal to generate 1 mc markers all the way up through 225 mc. The built in tone generator makes it possible to easily identify the markers. Including Minibox, tube, vrystal, etc. See Oct. '62 p 26.
W9DUT-3 ..... $15.00

TRANSISTORIZED MODULATOR. 40 watt modulator, excellent for plate modulating mobile rigs, four transistors, uses 12 volts dc, only draws 250 ma while resting with peaks of 4-5 amperes. Kit includes transistors, transformers, resistors, condensers, etc. See Sept. 62 p 24.
VE7QL $27.50

SHORT WAVE CONVERTER FOR HAMBAND RECEIVERS. One tube short wave converter so you can tune SW broadcast stations. Power supply included. See Aug. 62 p 38.
W2LLZ $13.00

RECEIVER-DECEIVER. Substitute local oscillator for your receiver for sideband reception, complete with power supply, tubes, voltage regulator, etc.
W2RWJ $19.95

HAM BAND AUTOMOBILE CONVERTER. Listen to the hambands instead of that rocky-roll junk. Transistor converter, complete with battery, etc., to tune 20 meter band. Crystal controlled.
VE2AUB $6.95

WRETCHED K2PMM

BADGES $1.00 each.

Individually engraved badges: $1.00 Room for first name and call, 3" x ¾", with pin and safety lock. Specify whether you prefer red with white letters or black with white letters.

BADGES FOR CLUB MEETINGS & HAMFESTS

Club badges 3" x 1" with name or initials of club on one line and first name and call on second, in groups of five or more: $1.50 each.

Order from

73 Peterborough, N. H.

OTHER 73 BULLETINS AND BOOKS

6UP Magazine. Now in its fifth month with back issues getting rarer and rarer. This VHF monthly magazine is edited by Jim Kyle K5JKX and presents up to the minute reports on activities on all VHF and UHF bands, technical articles of interest to VHF'ers, and other general information not to be found elsewhere. This is the only strictly VHF magazine being published now. If you are a VHF'er you won't want to miss a single issue of 6up . . . you should support it. Subscriptions are only $2 per year, back issues are available at present for those who would like a retroactive subscription.

ATV Bulletin. In direct refutation to the ARRL claim that amateurs are lagging technically are the 2000 readers of the semi-monthly Amateur Television Experimenter Bulletin, edited by W0KYQ. If you are at all interested in amateur television you should subscribe to ATV, the only source of operating and technical info on this amazing branch of our hobby. Back issues are virtually all sold out, so don't put off subscribing. $1 a year for six issues.

Ham-RTTY. This is the most complete book on the subject. Written for the beginning TT'er as well as the expert. More complete and authoriative than books at twice the price. Pictures and descriptions of all popular machines, where to get them, how much, etc. $2.00

Bound Volume 2. Complete library volume containing the 1962 issues of 73. $15.00

Binders. Bright red leather binding. Specify which year you want stamped on them: 60-1, 62, 63. Darbs. $3.00 each.

Care and Feeding of Ham Clubs—K9AMD. Carole did a thorough research job on over a hundred ham clubs to find out what aspects went to make them successful and what seemed to lead to their demise. This book tells all and will be invaluable to all club officers or anyone interested in forming a successful ham club. Hundreds of grateful letters have been received from clubs who have applied the ideas in this book. $1.00

Simplified Math for the Hamshack—K8LFI. This is the simplest and easiest to fathem explanation of Ohm's Law, squares, roots, powers, frequency/meters, logs, slide rules, etc. If our schools ever got wind of this amazing method of understanding basic math our kids would have a lot less trouble. 50¢

Index to Surplus—W4WKM. This is a complete list of every article ever published on the conversion of surplus equipment. Gives a brief rundown on the article and source. $1.50

Ham-TV—WØKYQ. Covers the basics of ham-TV, complete with how to get on the air for under $50. Not the usual theory manual, but a how-to-do-it book. $3.00

Surplus TV Schematics. You can save a lot of building time in TV if you take advantage of the real bargains available in surplus. This book gives the circuit diagrams and info on the popularly available surplus TV gear. $1.00

AN/ARC-2 Conversion. This transceiver sells in the surplus market for from $40 to $50 and is easily converted into a fine little ham transceiver. Covers 29 mc (160-80-75-40 meters). This booklet gives you the complete schematic and detailed conversion instructions. $1.00

AN/VRC-2 Conversion. Completely different from the ARC-2. This book gives you complete instructions on converting the inexpensive VRC surplus gear into a six meter wide band FM transceiver. There are probably over a thousand stations now operating on 52.525 mc around the country. Join the crowd. Fun. $1.00

Coils—K8BYN. Basic book which covers the theory and practical aspects of the many different types of coils found in ham work. Well illustrated. 50¢

CW—W6SFM. Anyone can learn the code. This book, by an expert, lays in a good foundation for later high speed CW ability. 50¢

3D Map of World. Maybe you've been eating your heart out for one of these beautiful relief maps after seeing one at a friend's shack. Comes complete with one year subscription or extension to 73. $9.95

3D Map of U. S. Complete with one year sub to 73. $9.95

Mickey Miker—WØOPA. Complete instructions for building a simple precision capacity tester. Illustrated. 50¢

Frequency Measuring—WØHKF. Ever want to set yourself up to measure frequency right down to the gnat's eyebrow? An expert lets you in on all of the secrets. Join Bob high up on the list of Frequency Measuring Test winners. $1.00

Impedance Bridge. Full scale construction prints for the bridge described in the August 1961 issue of 73. Comes complete with a reprint of the article. Watch out General Radio! $1.00

SSB Transceiver Schematic—W6BUV. Giant size schematic of the transceiver that appeared in the November 1961 issue of 73. Complete with extra November issue. $1.00

Radio Bookshop

Transistor Radio Handbook

Editors and Engineers, publishers of the Radio Handbook, have just published a new transistor book. This one starts with simplified theory and goes into a wealth of practical construction projects including audio and speech amplifiers, VHF transmitting and receiving equipment, single sideband exciters and a complete sideband transceiver. **Order Number 113**

5—ANTENNAS—Kraus (W8JK). The most complete book on antennas in print, but largely design and theory, complete with math. **$12.00**

11—16TH EDITION RADIO HANDBOOK—by Bill Orr W6SAI. This fantastic book is loaded with the most understandable theory course now available in our hobby plus dozens of great construction projects. This is the best ham handbook in print by a wide margin. Easily worth twice the price. **$9.50**

13—REFERENCE DATA FOR RADIO ENGINEERS. Tables, formulas, graphs. You will find this reference book on the desk of almost every electronic engineer in the country. Published by International Telephone and Telegraph. **$6.00**

16—HAM REGISTER—Lewis (W3VKD). Thumbnail sketches of 10,000 of the active and well known hams on the air today. This is the Who's Who of ham radio. Fascinating reading. Only edition. Now only **$2.50**

18—SO YOU WANT TO BE A HAM—Hertzberg (W2DJJ). Second edition. Good introduction to the hobby. Has photos and brief descriptions of almost every commercially available transmitter and receiver, plus accessories. Lavishly illustrated and readable.. **$2.95**

21—VHF HANDBOOK—Johnson (W6QKI). Types of VHF propagation, VHF circuitry, component limitations, antenna design and construction, test equipment. Very thorough book and one that should be in every VHF shack. **$2.95**

22—BEAM ANTENNA HANDBOOK—Orr (W6SAI). Basics, theory and construction of beams, transmission lines, matching devices, and test equipment. Almost all ham stations need a beam of some sort . . . here is the only source of basic info to help you decide what beam to build or buy, to install it, how to tune it **$2.70**

23—NOVICE & TECHNICIAN HANDBOOK—Stoner (W6TNS). Sugar coated theory: receivers, transmitters, power supplies, antennas; simple construction of a complete station, converting surplus equipment. How to get a ham license and build a station. **$2.85**

24—BETTER SHORT WAVE RECEPTION—Orr (W6SAI). How to buy a receiver, how to tune it, align it, building accessories; better antennas; QSL's, maps, aurora zones, CW reception, SSB reception, etc. Handbook for short wave listeners and radio amateurs. **$2.85**

26—S9 SIGNALS—Orr (W6SAI). A manual of practical detailed data covering design and construction of highly efficient, inexpensive antennas for the amateur bands that you can build yourself. **$1.00**

27—QUAD ANTENNAS—Orr (W6SAI). Theory, design, construction, and operation of cubical quads. Build-it yourself info. Feed systems, tuning. **$2.85**

28—TELEVISION INTERFERENCE—Rand (W1DBM). This is the authoritative book on the subject of getting TVI out of your rigs and the neighbors sets. **$1.75**

32—RCA RADIOTRON DESIGNERS HANDBOOK—1500 pages of design notes on every possible type of circuit. Fabulous. Every design engineer needs this one. **$7.50**

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49—ELECTRONIC COMMUNICATION—Shrader. Huge book aimed at giving all information necessary for FCC Commercial and amateur licenses. **$13.00**

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55—TRANSISTOR CIRCUIT HANDBOOK—Simple, easy to understand explanation of transistor circuits. Dozens of interesting applications. **$4.95**

63—GE TRANSISTOR MANUAL—6th edition. This is one of the best buys around: 22 chapters, 440 pages, diagrams by the gross, data, facts, charts, etc. If you don't have this one you just aren't up to date. only **$2.00**

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SPECIAL SPECIAL SPECIAL

Radio Handbook, 15th Edition, written by Bill Orr W6SAI, over 800 pages. Covers every phase of amateur radio from the very basics right up through the construction of just about everything you could want in ham gear. Originally published at $8.50. Superceded by the new 16th edition which is the same except for new construction projects and selling for $9.50 (see number 11). Special, until the last few copies are gone, only **$5.95!**

80—SURPLUS RADIO CONVERSION MANUAL VOLUME NO. 1 (second edition). This book gives circuit diagrams, photos of most equipment, and rather good and complete conversion instructions for the following: BC-22 BC-342, BC-312, BC-348, BC-41 BC-645, BC-946B, SCR-274N 45 series receivers conversion to 10 me receivers, SCR-274N 457A series tran mitters (conversion to VFO)SCR-5 (BC-624 and BC-625 conversion to meters), TBY to 10 and 6 meters, P 103A, BC-1068A/1161A receiver to meters, Surplus tube index, cross i dex of A/N tubes vs. commerci types, TV & FM channels. **$3.0**

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83—THE SURPLUS HANDBOOK, VOLUME I—Receivers and Transmitters. This book consists entirely of circuit diagrams of surplus equipment and photos of the gear. One of the first things you really have to have to even start considering a conversion of surplus equipment is a good circuit diagram. This book has the following: APN-1, APS-13, ARB, ARC-4, ARC-5, ARN-5 VHF, ARN-5, ARR-2, ASB-7, BC-222, -312, -314, -342, -344, -348, -603, -611, -624 (SCR-522), BC-652, -654, -659, -669, -683, -728, -745, -764, -799, -794, BC-923, 1000, -1004, -1066, -1206, -1306, -1335, BC-AR-231, CRC-7, DAK-3, GF11, Mark 11, MN-26, RAK-5, RAL-5, RAX, Super Pro, TBY, TCS, Resistor Code, Capacitor Color Code, JAN/VT tube index. **$3.00**

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109—AMATEUR RADIO TOWER INSTALLATION INFORMATION—published by Rohn. Nearly 100 pages of info on selecting, buying and setting up towers for amateur radio. While this book is one of the most complete catalogs of Rohn towers ever published, it also has all the instructions you could possibly want on installing your tower. Lots of good color pictures. Well worthwhile. **$1.25**

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AMA-1—AMATEUR RADIO ANTENNA HANDBOOK—by Hooton W6TYH. Basic theory, construction and tuning of all the well known and effective ham antennas. Good stuff on feed lines and towers too. **$2.50**

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MCN—MODERN COMMUNICATIONS COURSE—by Noll. Aimed more at commercial radio than amateur, but an excellent book for home study or class work. Covers transmitters and antennas quite well. **$4.95**

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Car Plates

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QST 1 yr.	**$5.00**
CQ 1 yr. (not recommended)	**$5.00**
Popular Mechanics 1 yr.	**$4.00**
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Science & Mechanics 1 yr.	**$4.00**
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Jan. 64	Ontario
May 63	Out-O-Door
June 63	Palmer
Jan. 64	Parks
Jan. 64	Pauls Surplus
59	Pausan
Jan. 64	P & H
77	Poly-Paks
Mar. 63	Polytronics
Jan. 64	Propagation Products
July 63	QTH MAPS
Oct. 63	Quaker
61	Quement
90	Radio Bookshop
72	Radio Ham Shack
Apr. 63	Radio Industries
Nov. 63	Radio Publications
July 63	Ready Radials
Feb. 64	Redline
Sept. 63	Reed
June 63	Rex
83	Reyco
Apr. 63	Ritco
19	Rohn
Nov. 63	Rowe
Dec. 63	R & S
83	RW Electronics
Sept. 63	Sams
35	Saxton
Feb. 63	Schober
9	Sideband Engineers
Apr. 63	S. J. Electronics
21	Skylane
79	Slep
83	Space
Feb. 64	Spitz
Nov. 63	Sprague
29	Squire-Sanders
47	SSB ARA
June 63	Star
89	Subscriptions
Nov. 63	Super-Q
27	Swan
June 63	T A B
Feb. 63	Technical Manuals
11	Technical Material
June 63	Telemarine
Feb. 64	Telemethods
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45	Texas Crystal
Feb. 64	Thermoelectric D.
39	Topaz
80	Transistors Ult.
Jan. 64	Trans Pro
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Nov. 63	Tri-Ex
June 63	Tri-State
Aug. 63	United
Feb. 63	US Crystals
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Apr. 63	Valley
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Jan. 64	V & H
Jan. 63	Vibroplex
Oct. 63	WA6DUW
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75	Western (Calif.)
71	Western (Neb.)
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Apr. 62	Zalytron
89	73 Subscriptions
91	73 Products
90	73 Parts Kits
31	6 Up

An Award

To Merrill Swan W6AEE

The defunctation of the Edison Award (I don't recall seeing one in 1963) got me to thinking again about the need for a meaningful award in amateur radio. While I agreed with the judges on their selection of Edison winners for most years, there were times when I was disappointed and felt that their selection did not serve amateur radio well.

It came as a shock to me a few years back to find that there were some amateurs who were actively seeking the Edison Award and that this was their goal when they were rendering service to amateur radio and the public. An editor gets to know these chaps quickly for they are constantly seeking all the publicity possible for small acts of service.

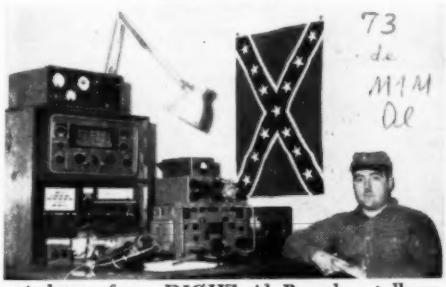
There are many amateurs who have devoted a large part of their lives to making amateur radio a better hobby (or service) and I'd like to see these fellows reap some small reward to let them know that we all appreciate the job they have done or are doing. In the interests of bringing recognition to the fellows who are real backbone of our hobby the Institute of Amateur Radio is sponsoring an award for those who have done outstanding work in amateur radio.

All amateurs are hereby requested to sit in careful cognitation and send in their nominations for any amateur that they feel has done an outstanding job of service, made amateur radio more fun for us, made a significant technical discovery, or has in any way made amateur radio a better hobby or service. The most likely nominations will be published each month in 73 and members of the Institute will be asked to send in their vote for the person they feel should be given the award. Winners will be announced in 73.

By way of getting the Institute Outstanding Amateur Award off to a good start the first Award has been made to Merrill Swan W6AEE for his work in the cause of amateur RTTY. Merrill has devoted his life for well over ten years to RTTY and has been responsible in a large measure for its remarkable growth. He has edited and published the RTTY bulletin for over ten years, been instrumental in the distribution of hundreds of teleprinters to amateurs all over the country, brought about new and important technical developments in RTTY converters through his own work and the encouragement of others, traveled widely to speak to groups and help individuals in furthering his cause, and has been a true pioneer in this field. His work and achievements are in the best traditions of amateur radio and we all can be proud that we have amateurs of this stature. Merrill Swan W6AEE, we salute you and offer you the Institute of Amateur Radio Outstanding Amateur Award as a symbol of our gratitude.

Please, in sending in your nominations, give as much information as possible on the activities of your nominee so the Institute members will be able to make the wisest choice for the Awards.

San Marino



A letter from DJØHZ Al Brogdon tells us how he managed to get a license to operate from San Marino. You write a letter, in Italian, to Ministero Poste e Telecomunicazioni, Ispettorato Generale delle Telecomunicazioni, Direzione Centrale dei Servizi Radioelettrici. Divisione 1A, Roma, Italy. This will help speed you through customs at the Italian border and grant you permission to operate in San Marino. Allow three months, at least, for the red tape to unfurl. Also include the dates of anticipated operation, frequency bands to be used, transmitter output, proposed location and a photocopy of your home license. Al got the letter just days before scheduled operation, got through the borders all OK, took the letter to the local police department in San Marino and registered himself and station. Since no actual call was assigned (they sugegsted he select a 9A1 call, but the M1 prefix was still OK), Al took M1M (fine for CW) and during three days satisfied 1400 DX'ers.

Propagation Charts March 1964

EASTERN UNITED STATES TO:

GMT -	00	02	04	06	08	10	12	14	16	18	20	22
Alaska	14	7	7	3.5	3.5	3.5	7	7	7*	14	14	14
Argentina	14	7*	7	7	7	7	14	21	21	21	21*	21
Australia	14	14	7	7	7	7	7	14	14	7	14	14
Canal Zone	14	7	7	7	7	7	14	14	21	21	21	21
England	7	7	3.5	3.5	3.5	7	7*	14	14	14	14	7
Hawaii	14	7*	7	7	7	7	7	7	14	14	14	14
India	7	7	3.5	3.5	3.5	7	14	14	14	7*	7	7
Japan	14	7	7	7	3.5	3.5	7	7	7	7	7	14
Mexico	14	7	7	7	7	7	7	14	14	21	14*	14*
Philippines	7	7	7	7	7	3.5	7	7	7*	7*	7	14
Puerto Rico	14	7	7	7	7	7	14	14	14	14	14*	14
South Africa	14	7	7	7	7	7*	14	14	21	21	21	14
U.S.S.R.	7	7	3.5	3.5	3.5	7	14	14	14	7*	7	7

CENTRAL UNITED STATES TO:

GMT -	00	02	04	06	08	10	12	14	16	18	20	22
Alaska	14	14	7	7	3.5	3.5	7	7	7*	14	14	14
Argentina	21	14	7	7	7	7	14	21	21	21	21	21
Australia	21	14	7*	7	7	7	7	7*	14	7	14	21
Canal Zone	14*	14	7	7	7	7	7*	14	21	21	21	21
England	7	7	3.5	3.5	3.5	3.5	7	7*	14	14	14	7
Hawaii	14*	14	7*	7	7	7	7	7	14	14	14	14
India	7	7	7	7	3.5	3.5	7	7*	14	7*	7	7
Japan	14	14	7	7	3.5	3.5	7	7	7	7	7*	14
Mexico	14	7*	7	7	7	7	7	14	14	14	14	14
Philippines	14	14	7	7	3.5	3.5	7	7	7*	7*	7	14
Puerto Rico	14	7	7	7	7	7	14	14	21	21	21	21
South Africa	14	7	7	7	7	7	14	14	14	14*	14*	14
U.S.S.R.	7	7	7	7	3.5	3.5	7	7*	14	7*	7	7

WESTERN UNITED STATES TO:

GMT -	00	02	04	06	08	10	12	14	16	18	20	22
Alaska	14	14	7	7	7	3.5	3.5	3.5*	7	7	14	14
Argentina	21	14	7*	7	7	7	7	14	14	21	21	21
Australia	21	14*	14	7*	7	7	7	7	14	7	14	21
Canal Zone	14	14	7	7	7	7	7	14	14	14*	21	21
England	7	7	3.5	3.5	3.5	3.5	7	7	14	14	7*	7
Hawaii	21	14*	14	7	7	7	7	7	14	14	14	21
India	7	14	7	7	7	7	7	7	7*	7*	7*	7
Japan	14	14	14	7	7	7	7	7	7	7	14	14
Mexico	14*	14	7	7	7	7	7	14	14	14	14	14*
Philippines	14	14	14	7	7	7	7	7	7	7*	7	14
Puerto Rico	14	14	7	7	7	7	7	14	14	14*	14*	14*
South Africa	14	7	7	7	3.5	7	7	14	14	14	14	14
U.S.S.R.	7	7	7	7	7	3.5	7	7	14	7	7	7

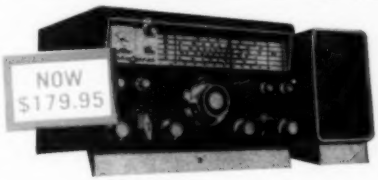
Good: 1-2, 8-9, 14-16
Fair: 3-5, 7, 13, 22-25, 30-31
Poor: 6, 10-12, 17-21, 26-29

***Means next highest frequency might be useful.**

J. H. Nelson

WRL Makes Quantity Purchase Of New National Receivers

$20,000 Savings Offered By World Radio Laboratories



Council Bluffs, Ia. (HAM)—Leo I. Meyerson, WØGFQ, President of WRL quotes:"I have just purchased a stock of New National Receivers, at a hot price. This savings will be passed on to our customers." Leo also stressed, "We shall give top trade-in allowances despite the bargain prices on these receivers. For the past 28 years WRL

SAVE $100.00 *NC-270*

A SAVINGS OF OVER 35% on the regular price of $279.95 on the famous NC-270,...a double conversion receiver, 6 to 80 meter ham band coverage and other features, including: selectable sideband; five selectivity positions—600 cy. /5Kc.; both product and diode detectors; high order stability for SSB/AM/CW reception; 1 uv. sensitivity for 10DB SN ratio; built-in 100 Kc. calibrator, ANL; "S" meter; etc. Size 8⅝" x 15⅝" x 9". Approx. 28 LB. less speaker.

ORDER # XM227 ($10.00 monthly on Charg-A-Plan) cash $179.95

ALSO SUPER HI TRADE-IN ON THESE HOT LOW PRICES

SAVE $30.45 *NC-105*

A SAVINGS OF OVER 25% on the regular price of $119.95 on the NC-105, and offering continuous coverage over 550KC to 30 Mc. Includes: "S" meter; noise limiter; "Q" multiplier; built-in speaker; special hi-fi tuner output jack, etc. Size: 7⅝" x 13½" x 8⅝". Approx. 25 LB.

ORDER # XM229 ($5.00 monthly on Charg-A-Plan) cash $89.50

SAVE $50.45 *NC-155*

A SAVINGS OF OVER 25% on the regular price of $199.95 on the NC-155, and offering the amateur an outstanding buy in a ham band receiver covering 6 to 80 meters. Superb SSB/AM/CW reception; selectable SB; five positions of selectivity from 600 cy. to 5 Kc.; "S" meter; 60:1 dial reduction; 1 uv for 10 DB SN sensitivity; ANL, and other outstanding features usually costing more than $250.00. Size: 8⅝" x 15½" x 9". Approx. 25 LB. less speaker.

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Quote trade-in allowance on my _____ ( ) Send info on Charg-A-Plan.

Name _____ call _____
Address _____
City _____ State _____

...need we say more?

Have been in amateur (and commercial) radio since the '20's, and the NCX-3 is the most enjoyable and interesting rig I ever owned. W7M--, Seattle, Washington

In comparison with a higher priced unit ur NCX-3 walked away with the honors. I am more than pleased with my NCX-3. K9U--, Rockford, Illinois

Amazed at the ease of operation and tuning. Fine quality signal reports. K6O--, Palo Alto, California

I have used SB gear commercial and amateur. NCX-3 tops even commercial. K5G--, Midkiff, Texas

I have always believed National to be the best; now I am sure. NCX-3 is best in the field. WN5F--, Vicksburg, Mississippi

Best I have used in 32 years. Excellent. W1G--, Framingham, Mass.

This is without doubt the best buy ever made. K6B--, Fresno, California

The advertising on the NCX-3 is completely misleading. The equipment looks considerably better than the pictures in the advertising. The performance and styling is much better than advertised. W4Y--, Grovetown, Georgia

Far better performance than anyone has a right to expect. W9K--, Park Ridge, Illinois

Best transceiver design in its price class. DJ5--, West Germany

Finest piece of communications gear of this type I have seen and used. W9W--, Taylorville, Illinois

Having a ball with it! Excellent reports audio wise and signal strength. W1H--, Merrimac, Massachusetts

I've had the NCX-3 just over a month now, and I must say that it does everything your advertisements say and then some. W1--, Portland, Maine

I get amazing signal reports on mobile op. Most fun I've had since I got on the air! Very excellent piece of electronic equipment. W6L--, Mission San Jose, California

NCX-3 is untouchable in its class. WN5F--, Vicksburg, Mississippi

How you did it I don't know. The rig is absolutely unbelievable, fabulous. WA2J--, Freeport, New York

This is one of the nicest pieces of equipment I have ever had the privilege to own. KØI--, Cedar Falls, Iowa

I have been in ham radio for about 9 years and I am sure that this is the best piece of radio equipment ever to enter my room. Keep up the good work. W9R--, Belleville, Illinois

Best VOX I've ever used! K5R--, Dallas, Texas

Words cannot express my ultimate satisfaction with the NCX-3. Thanks to National for putting such a rig on the market. K9M--, Peoria, Illinois

Am quite surprised and pleased with my investment in the NCX-3. SSB reception quality is best I've heard. Good job National! K9A--, Cicero, Illinois

This rig is the best rig I have run for general performance. The SSB audio is terrific. WAOA--, Delta, Colorado

Best investment in amateur equipment I ever made! WA4A--, Colonial Heights, Virginia

Couldn't be happier. Wouldn't trade this NCX-3 for the world! K7V--, Williams AFB, Arizona

Best piece of amateur radio gear on the market for performance and price. W9R--, Indianapolis, Indiana

I wish to state the performance is beyond my expectations — the performance of the unit is excellent. Merriam, Kansas

Outperforms any other transceiver I have heard. National has done it again. K9L--, LaPorte, Indiana

You have a wonderful rig in the NCX-3! I wouldn't sell it for double the purchase price! Sure works fb on SSB and CW. Couldn't be more happy with the finest rig I've ever owned! WØP--, Independence, Kansas

The nicest piece of equipment I've had in many a year. W8L--, Lansing, Michigan

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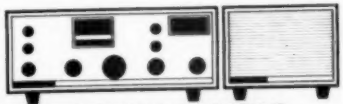

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